

UNCLASSIFIED

AD NUMBER

AD877960

LIMITATION CHANGES

TO:

Approved for public release; distribution is unlimited.

FROM:

Distribution authorized to U.S. Gov't. agencies only; Administrative/Operational Use; 1970. Other requests shall be referred to Office of the Assistance Secretary of Defense, Installations and Logistics, Washington, DC 20301.

AUTHORITY

ASD-RD ltr dtd 20 Jun 1974

THIS PAGE IS UNCLASSIFIED

✓
LOGISTIC SUPPORT *52*
IN THE VIETNAM ERA

AD877960

MONOGRAPH 2
AMMUNITION

AD 13

DDC FILE COPY

DDC
RECEIVED
DEC 28 1971
RECEIVED

A REPORT
BY THE JOINT LOGISTICS REVIEW BOARD

190



OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

18 DEC 1970

SS

INSTALLATIONS AND LOGISTICS

MEMORANDUM FOR THE DIRECTOR, DEFENSE DOCUMENTATION CENTER

SUBJECT: Joint Logistics Review Board Report

It is requested that the attached three volumes, eighteen monographs and five classified appendixes, which comprise the subject report, be made available for distribution through your center to U.S. Government agencies. The following distribution statement is provided as required by Department of Defense Directive 5200.20 dated 24 September 1970, subject: "Distribution Statements on Technical Documents:"

DISTRIBUTION STATEMENT "B"

Distribution limited to U.S. Government agencies only; the report contains detailed staff advice, opinions and recommendations prepared for use by logistics managers; statement applied 15 December 1970. Other requests for this document must be referred to the Office of the Assistant Secretary of Defense (Installations and Logistics) ATTN: OASD (I&L) SD.

Enclosures (26)
As stated

PAUL H. RILEY
Deputy Assistant Secretary of Defense
(Supply, Maintenance & Services)

Each transmitted to U.S. Government has been reviewed by the Dept. of Defense. (Installation and Logistics) after V/4SD(F+L) SD. 7 Dec 68 C. 20301

TABLE OF CONTENTS

	Page
LIST OF TABLES	iii
LIST OF FIGURES	v
I. INTRODUCTION	1
II. AMMUNITION LOGISTIC ORGANIZATION AND POSTURE—JANUARY 1965	5
III. AMMUNITION SUPPORT DURING THE VIETNAM CONFLICT	37
IV. GENERATION AND CONTROL OF AMMUNITION PROGRAMS	65
V. PROCUREMENT AND PRODUCTION OF MUNITIONS..	91
VI. PACIFIC THEATER DISTRIBUTION AND SUPPORT OPERATIONS	121
VII. SUMMARY	143
APPENDIX A. AIR MUNITIONS WEAPON AND WEAPONS SYSTEM COMPATIBILITY..	A-1
APPENDIX B. MUNITIONS PROCUREMENT ORGANIZATION, FUNCTIONS, AND CONTROLS	B-1
APPENDIX C. CLASSIFIED TABLES AND FIGURES...	C-1
APPENDIX D. LINE ITEM ASSET ANALYSIS	D-1
APPENDIX E. DRAWDOWN OF THE ATLANTIC FLEET	E-1
APPENDIX F. DRAWDOWN OF THE EUROPEAN THEATER	F-1
APPENDIX G. THE NORTHEAST ASIA CRISIS OF JANUARY 1968	G-1
APPENDIX H. SUMMARY OF LOGISTICS GUIDANCE RELATED TO AMMUNITION	H-1
APPENDIX I. LIST OF ACRONYMS AND ABBREVIATIONS	I-1
APPENDIX J. BIBLIOGRAPHY	J-1

TABLE OF CONTENTS

	Page
1. PERCENTAGE OF INVENTORY OBJECTIVES ON HAND FOR SELECTED AMMUNITION ITEMS AS OF 1 JANUARY 1965	30
2. WESTPAC MUNITIONS STOCKAGE (TONS), JANUARY 1965	32
3. WESTPAC AMMUNITION THROUGHPUT CAPABILITIES, TONS PER MONTH (SUSTAINED)	33
4. FY 69 MUNITIONS BUDGET CHRONOLOGY, IN MILLIONS OF DOLLARS	72
5. MUNITIONS PROGRAMS, FISCAL YEARS 1965 TO 1969, ALL SERVICES	95
6. COMPARISON OF GROWTH OF FISCAL YEAR MUNITIONS PROCUREMENTS AND PROCUREMENT STAFF	97
7. AGE DISTRIBUTION-PROCUREMENT FUNCTION	97
8. ARMY MUNITIONS FACILITIES PROJECTS	103
9. COMPARISON OF UNIT PRICE OF 81mm HE, M374 METAL PARTS (GOCO VERSUS PRIVATE INDUSTRY)	107
A-1. NAPALM BOMBS USED IN VIETNAM	A-5

LIST OF FIGURES

	Page
1. U.S. ARMY COMMAND AND LOGISTICS RELATIONSHIPS	9
2. USARPAC MUNITIONS SYSTEM, 1 JANUARY 1965 ...	11
3. COMMAND ORGANIZATION FOR THE MANAGEMENT OF AMMUNITION	12
4. MISSION ASSIGNMENTS, APSA	13
5. U.S. NAVY ORGANIZATION FOR THE MANAGEMENT OF AMMUNITION	15
6. NAVAL ORDNANCE SUPPORT SYSTEM	20
7. U.S. MARINE CORPS SIMPLIFIED ORGANIZATION CHART	22
8. U.S. AIR FORCE SIMPLIFIED ORGANIZATION CHART	24
9. CRITICAL PERIODS-NAVAL GUNFIRE SUPPORT AMMUNITION	60
10. NAVY AMMUNITION REPORT INFORMATION FLOW. .	87
11. AMMUNITION COMPONENT INVENTORY, COMPONENT LEAD TIME	110
12. COMMON COMPONENTS, CARTRIDGE, 105mm HE, M1	111
13. CONUS OUTBOUND AMMUNITION LIFT	124
14. NWS CONCORD MTMTS MANIFEST CARGO OUTLOADED	126
15. AMMUNITION RESUPPLY IN SUPPORT OF SEVENTH FLEET	130
16. AMMUNITION RESUPPLY IN SUPPORT OF RVN	131
A-1. MULTIPLE AND TRIPLE EJECTOR RACKS	A-4

CHAPTER I
INTRODUCTION

CHAPTER I

INTRODUCTION

1. **GENERAL.** The Terms of Reference for the Joint Logistics Review Board highlighted ammunition as an area for in-depth study. The importance of a thorough review stems from the critical nature of ammunition as the final and essential ingredient in the application of combat force; the direct dependence of the forces of each Service for readiness and performance on the control of ammunition logistics by their chains of command; the explosive characteristics that place special requirements on transportation, handling, and storage; the uncertainties in the prediction of expenditures; the extreme differences between ammunition logistics in times of peace and war; and the special considerations related to the Vietnam conflict and national policies concerning it.

2. **BACKGROUND.** Other factors have intensified the need for extraordinary management and stimulated special demands for information within the Services, the unified commands, and the Office of the Secretary of Defense. At the start of the buildup, worldwide assets were marginal for what was to ensue, although apparently available in adequate quantities when evaluated on the basis of the approved inventory objectives of that date. However, from the aspect of quality a significant portion of these assets were far from optimum. They consisted in large measure of obsolescent weapons remaining from the Korean era, many in unserviceable condition, and a variety of newly developed weapons (e.g., low-drag bombs, dispenser munitions, high-speed cluster bombs, special projectiles, and guided missiles), some of which were just entering the production phase. The peacetime production base, in the form of Government-owned ammunition plants and facilities, was of World War II vintage; it had never been modernized and was ill prepared for major expansion. Further, there had been little economic incentive for private industry to maintain the capabilities required to meet existing mobilization plans. As the conflict expanded and intensified, expenditures grew to unprecedented levels. The high rates of such expenditures; fluctuations in requirements as a result of enemy action, friendly operations, and the weather; and marginal asset positions created many critical situations requiring extraordinary measures. Peacetime fiscal policies, the desire to avoid surpluses at the end of a war assumed to be of short duration, and efforts to hold current funding expenditures at absolute minimum levels further compounded the problems and resulted in the application of stringent controls on production and allocation by all echelons of command and management.

3. SCOPE

a. Among the questions to be answered by this review is one concerning the extent to which, in retrospect, more adequate worldwide readiness could have been maintained and long-term economies achieved. The answer should provide guidance for future situations involving similar or different types of wars. Many good features in ammunition logistics have developed in this war. These will be explored with a view for providing lessons for the future.

b. Thus, the purpose of this monograph is to review and analyze ammunition logistics during the Vietnam conflict to derive lessons that will enhance U.S. ability to support future wars. Special emphasis is placed on the adequacy of assets versus requirements, the effectiveness of the planning for and the production and distribution of these assets, the associated controls, and economic considerations.

c. For this review, ammunition will be considered to embrace all ground, air, and naval expendable weapons, including missiles. However, since antisubmarine warfare, nuclear, biological, and lethal chemical weapons have not been employed in this period, they will not be considered. Further, because of the minimal expenditures of anti-air weapons, few significant lessons can be derived with respect to these munitions; consequently they will not be treated in depth.

AMMUNITION

4. ORGANIZATION OF MONOGRAPH. To serve as a point of departure and to establish a background against which results and changes can be evaluated, a review is made of service ammunition logistic systems in being in January 1965 and of existent Department of Defense policies. This is followed by a review of the responsiveness of ammunition logistics in support of the Vietnam conflict and of worldwide readiness. Subsequent chapters deal with the changes in policies and systems and with principal issues as they have been identified. Though some of the lessons learned in the past fade from view in eras of peace, the experience of the Vietnam conflict has been unique in many ways and provides us with much new information of importance to ammunition logistics for the future.

CHAPTER II
AMMUNITION LOGISTIC ORGANIZATION
AND POSTURE—JANUARY 1965

CHAPTER II

AMMUNITION LOGISTIC ORGANIZATION AND POSTURE—JANUARY 1965

1. ROLES AND RESPONSIBILITIES OF THE SERVICES

a. To gain a full appreciation for the multifaceted aspects of ammunition logistics in the Vietnam era--the problems encountered, actions taken, and lessons learned—it is pertinent to review the background scene as it existed in January 1965. Consequently, this chapter will first examine the principal responsibilities of the Services for the support of forces and describe the logistic systems used within each Service to discharge these responsibilities. Second, it will present a review of the controls exercised by the Secretary of Defense, the Joint Chiefs of Staff, the Commander in Chief, Pacific, and the Commander, U.S. Military Assistance Command, Vietnam, as they interfaced with and complemented Service logistic systems and responsibilities in the area of ammunition logistics. Third, in order to place subsequent events in proper perspective, the then existent strategic and economic climate will be briefly discussed and the ammunition readiness posture of the Services immediately prior to the Vietnam buildup will be appraised, with primary focus on the Pacific.

b. As in other logistic support areas, the provision of ammunition to combat forces is a Service responsibility, statutorily assigned by Title 10 U.S. Code. These responsibilities are amplified by the Secretary of Defense in DOD Directive 5100.1, Article V, which assigns certain common functions to the military departments and Services. Among these are to:

(1) "Prepare forces and establish reserves of equipment and supplies for the effective prosecution of war...."

(2) "Organize, train and equip forces for assignment to unified or specified commands."

(3) "Prepare and submit to the Secretary of Defense budgets for their respective Departments; administer the funds made available for maintaining, equipping and training the forces of their respective Departments, including those assigned to unified and specified commands."

c. From the above-referenced documents stems the basic responsibility of the Army, Navy (including Marine Corps), and Air Force to equip their forces for the conduct of sustained combat operations. Each Service had in being an ammunition logistic system for this purpose.

2. ARMY MUNITIONS LOGISTIC SYSTEM

a. General

(1) To counter the enemy threat to the degree deemed necessary, in January 1965 a requirement existed for the strategic deployment of Army combat forces in both the European and Pacific theaters. The logistic plan as pertaining to munitions support to these forces called for a specified number of days of supply on hand to sustain them in combat pending establishment of a pipeline for continuous resupply. In the Pacific theater, the various contingency plans, each oriented to a different threat in a geographically removed area, necessitated the prepositioning of varying quantities and types of munitions in several geographic locations. This complexity did not prevail in the European theater. The responsibility for the management of these munitions assets was vested in the Army component commanders. The prevailing peacetime austerity provided for a minimum logistic structure in the munitions area. As a

AMMUNITION

consequence, the munitions logistic system in both the continental United States (CONUS) and overseas theaters, largely civilian in structure, was oriented toward maintenance of existing stocks as opposed to provision of logistic support to the deployed combat forces, as would have been the case in military structure. Contrary to the peacetime logistic structure, in time of war the Army depended heavily on the mobilization of Reserve units and private enterprise to supplement the logistic structure to support deployed combat forces.

(2) To provide an incisive analysis of the Army munitions logistic system as it existed on 1 January 1965, the discussion has been divided into three segments: a description of the regulatory controls and organization across the entire system, a general picture of the operational portion of the system, and a description of the CONUS Army support base.

b. Regulatory Responsibilities and Authorities

(1) The regulatory responsibilities pertinent to Army management of munitions consist of Army Regulations, Supply Bulletins, and Table of Allowances. These regulatory documents, when integrated with appropriate major command troop strengths, operational plans, missions, and command regulations, form a broad base from which ammunition requirements are developed. These requirements essentially dictate the form of a logistic system to support a given major command. Since roles and missions, and hence requirements, vary among the Army theaters and the Continental Army Commands, it follows that no two major Army commands will necessarily have identical ammunition logistic systems. This was the case at the onset of the Vietnam conflict.

(2) The organization of the Army munitions logistic systems remains essentially the same today as it was prior to the buildup in SE Asia. However, it has been fleshed out considerably and certain responsibilities, over time, have migrated to higher authority. Prior to the buildup the system was oriented to a peacetime environment, limited to the support of the U.S. Army Support Command, Vietnam; Military Assistance Programs, both grant aid and sales; and annual Army training requirements. For the most part, these requirements were met from available stockpiles, derived from the Korean conflict. The balance was furnished from a limited annual production program.

(3) Munitions management in this peacetime environment was accomplished by the U.S. Army Munitions Command (MUCOM), a subordinate command of the U.S. Army Materiel Command (AMC). Although MUCOM has the overall mission responsibility for all facets of ammunition logistic support to the Army, the actual functions of procurement, production, quality assurance, maintenance, and supply are performed by the U.S. Army Ammunition Procurement and Supply Agency. This agency is the Army National Inventory Control Point (NICP) for munitions. In this role, it interfaces, through logistic channels, directly with all Continental Army Commands and major overseas commands, and is responsible for those facets of logistic support related to reporting, requisitioning, storage, movement, distribution, maintenance, evacuation, and disposition of munitions. This organizational relationship, including command and logistic channels, is outlined in Figure 1. Prior to the buildup in SE Asia, the ammunition staffs in the Department of Army and AMC were at a minimum consistent with the peacetime workload.

(4) The management of munitions in the U.S. Army, Pacific (USARPAC), theater was accomplished by a small branch within the theater Inventory Control Point (ICP) located at Headquarters, USARPAC, in Hawaii. As the buildup progressed in Vietnam, this small branch expanded to a division and ultimately in 1967 to a directorate employing 42 people. Essentially the mission of this branch was the centralized management of all theater munitions assets. In the early days of the Vietnam buildup, the munitions branch was furnished policy guidance from the Munitions Staff of the G-4 Division of Headquarters, USARPAC. The organizational interface with the USARPAC subordinate commands was accomplished through logistic channels from the munitions branch direct to the ammunition stock control element of the subordinate commands. Prior to the deployment of U.S. combat elements to Vietnam these subordinate commands were the U.S. Army Eighth (USAREIGHT), Korea; U.S. Army Hawaii (USARHAW); U.S. Army Japan (USARJ); U.S. Army Ryukyu Islands (USARYIS); and U.S. Army Support Command, Vietnam. The command channels were from Commanding General (CG), USARPAC, to the commander of

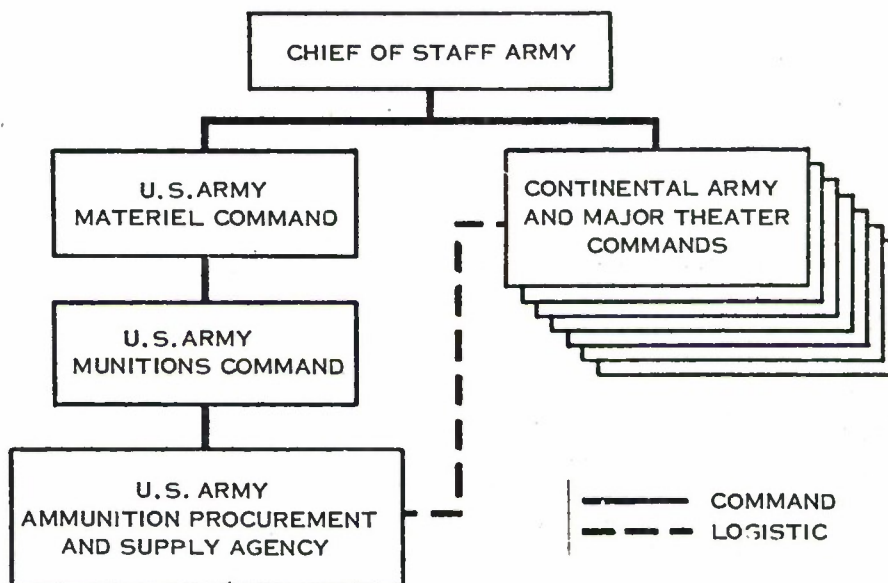


FIGURE 1. U.S. ARMY COMMAND AND LOGISTIC RELATIONSHIPS
(SIMPLIFIED MUNITIONS LOGISTICS INTERFACES)

Source: U.S. Army Munitions Command Brochure, The Management of Munitions, undated.

the respective subordinate commands. The USARPAC interface with the CONUS support base was through logistic channels direct to the NICP located at the Ammunition Procurement and Supply Agency (APSA), Joliet, Illinois, whereas command channels were from CGUSARPAC to the Department of Army.

(5) Within the Pacific theater of operations, the Commander in Chief, Pacific (CINCPAC), retained the review and approval authority over USARPAC contingency planning, which included the necessary logistic annexes. By and large, the logistic support planning and the day-to-day logistic operations remained the responsibility of the component commands. In this environment, CINCPAC was kept informed by USARPAC, through communications media, of those significant logistic actions pertinent to the combat readiness of the Army component command. In effect, an era of responsibility commensurate with authority prevailed.

c. Operational Logistics

(1) Activity in the munitions logistic area in USARPAC prior to the buildup in Vietnam was relatively slow. Essentially the activity was limited to maintenance of the theater Pre-positioned War Reserve (PPWR) and excesses thereto located in USARHAW, USARYIS, and USARJ; logistic support to the 5th Special Forces in Vietnam and the U.S. Army Support Command, Vietnam; and support of annual training requirements throughout the theater. In addition, munitions logistic support was provided to specific nations within the Pacific theater under the auspices of the Military Assistance Program (MAP). This support was accomplished under the direction of CINCPAC who passed the requirements to the NICP, which, in turn, directed fill from worldwide assets or production as appropriate. The USARPAC participated in this support to the extent directed by the NICP. The predominate effort was in support of Southeast Asia and Korea. Ammunition supply throughout the theater was effected on a "pull" requisition basis.

AMMUNITION

(2) The USARPAC subordinate commands, with the exception of U.S. Army Support Command and the 5th Special Forces, requisitioned direct from the theater ICP, which, in turn, either filled from theater assets in excess to the PPWR or passed the requisitions to the NICP to fill. The two exceptions, U.S. Army, Vietnam (USARV), and the 5th Special Forces, requisitioned from the 2d Logistical Command in USARYIS. In turn, USARYIS either filled the requisitions from excess assets or passed the requisition to the theater ICP for fill, which either filled from other theater locations or, alternatively, passed the requisition to the NICP for action. In effect, the allocation, supply, and distribution of munitions assets, insofar as they were available within the USARPAC theater, were accomplished by the theater ICP in close coordination with the NICP. The procedures in effect on 1 January 1965 are depicted in Figure 2.

(3) In peacetime the determination of requirements at the major Army command level is essentially a mathematical computation. Requirements for annual training are authorized in the Table of Allowance (TA) 23-100 series. Requirements for major command stockage levels are set forth in Army Regulation (AR) 11-11 for each major command in days of supply. A day of supply is computed using the authorized daily consumption rates, set forth in Supply Bulletin (SB) 38-26, multiplied by the number of weapons authorized a given command. This total day of supply, when multiplied by the number of days authorized for each major command in AR 11-11, provides the total authorized level for a given type of munitions. Munitions items not peculiar to a weapon utilize numbers of personnel as a base, in lieu of numbers of weapons. Approved theater-peculiar operation projects for given tactical contingencies provide for additional levels of munitions stocks; however, the requirements are computed in the same general manner. These total requirements reported by each major command to the NICP, when compared to worldwide asset positions, form the basis for procurement and distribution planning. These procedures, developed during and subsequent to World War II and used during the Korean conflict, remain in effect today for all major Army commands including USARPAC.

(4) The munitions reporting systems in effect on 1 January 1965 were peacetime oriented and were reasonably adequate in that environment. Within the Pacific theater two reports existed. For management of munitions assets within the Pacific Command (PACOM), an asset balance report was initiated and furnished monthly to the theater ICP by each subordinate command. This report was either prepared manually or by computer, depending on the capability of the subordinate command. It contained the necessary characteristics of assets on hand and pertinent transaction data for each type of munition. For management of munitions worldwide, the Army depended on the Ordnance Ammunition Stock Status Report (RCS: ORD 26 (RI)). This report was submitted quarterly by all major Army commands with the exception of USARPAC. This exception related primarily to the fact that all the munitions stored in the theater were not truly theater assets but, in fact, included excesses from the Korean conflict. This peculiarity of asset ownership dictated that each subordinate command within USARPAC submit individual ORD 26 (RI) reports on a quarterly basis directly to the NICP. The great amount of effort required to prepare this report—it had 16 columns of data for each line item, typed on 12-by-18-inch preprinted forms and, depending on the subordinate command, consisted of up to 300 pages—usually resulted in a submission date of up to 60 days subsequent to the cut-off date. The data content of this report, coupled with the frequency and delayed submission, decreased its value as a management tool at theater level. Notwithstanding its low value to the theater, this report provided the NICP the munitions data necessary for asset and distribution planning and determination of procurement objectives.

d. CONUS Support Base

(1) As previously indicated, in early 1965 the Army organization comprising the CONUS munitions support base was MUCOM whose mission was essentially to exercise integrated commodity management of conventional, nuclear, chemical, and biological munitions and related items such as propellant actuated devices, bulk explosives, and propellants in support of the requirements of the Army, Air Force, Marine Corps, to a limited extent Navy, and international logistic customers.¹ The organization and mission responsibilities of the four commodity centers of MUCOM and of APSA are depicted in Figures 3 and 4, respectively.

¹U.S. Army Munitions Command Brochure, The Management of Munitions, Dover, New Jersey.

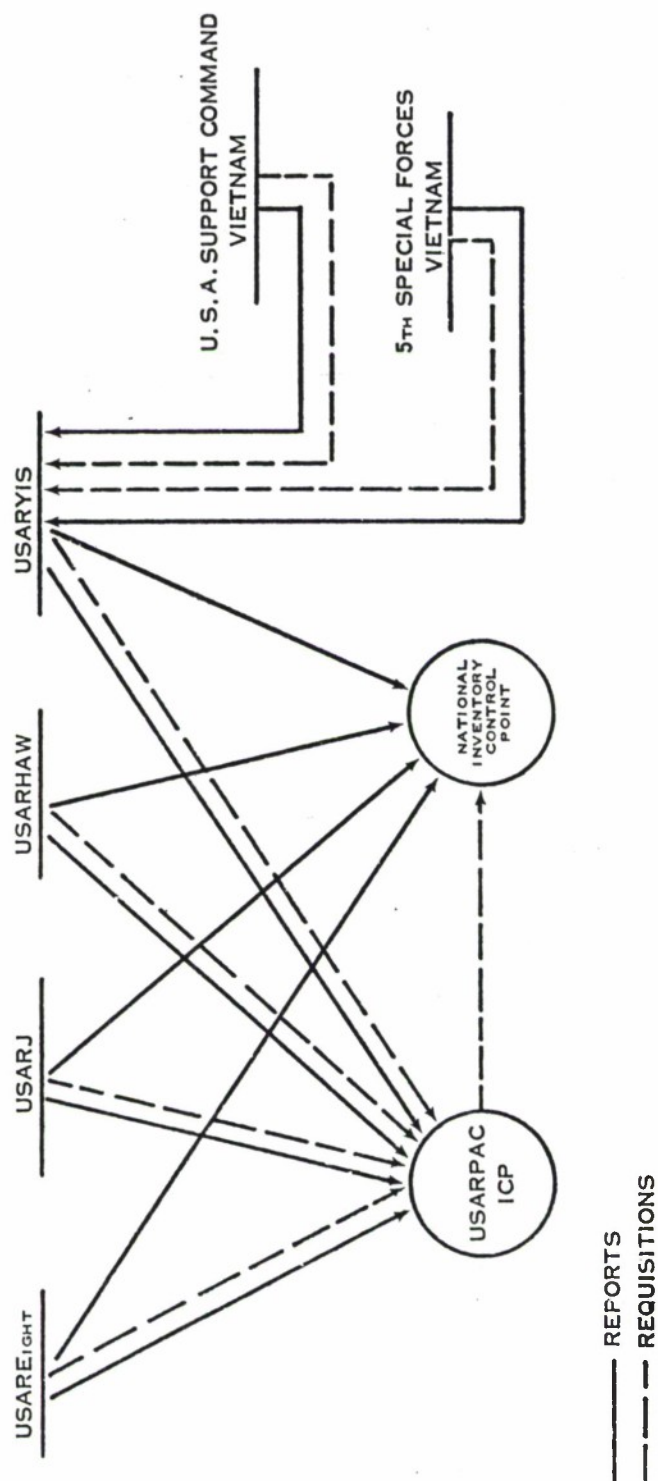


FIGURE 2. USARPAC MUNITIONS SYSTEM -1 JANUARY 1965

Source: U.S. Army, DCSLOG Memorandum, subject: Ammunition Logistics in Support of SE Asia Operations, 1965-1968, 3 September 1969.

AMMUNITION

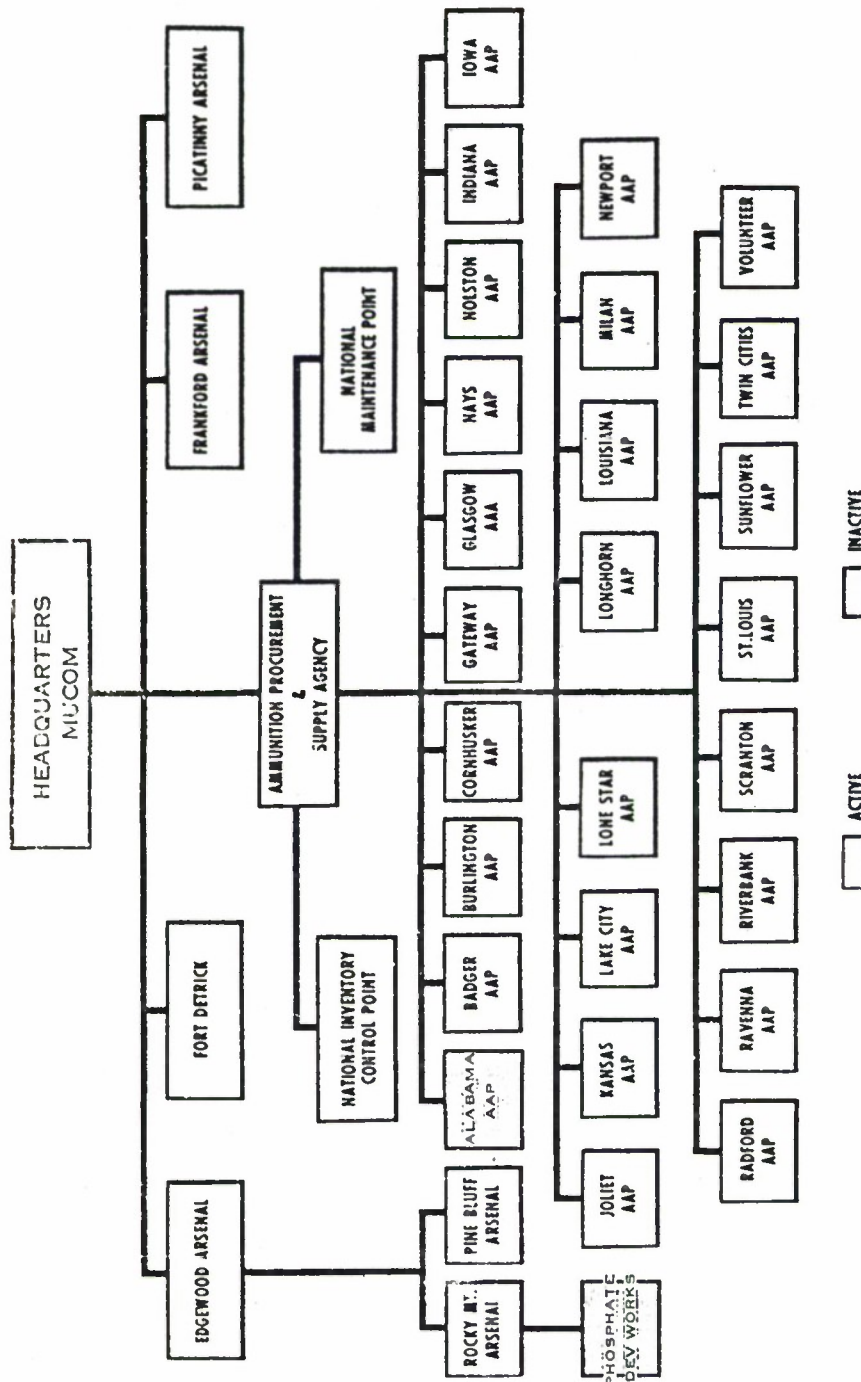


FIGURE 3. COMMAND ORGANIZATION FOR THE MANAGEMENT OF AMMUNITION

Source: U.S. Army Munitions Command Brochure, The Management of Munitions, undated.

AMMUNITION

FUNCTION COMMODITY		RESEARCH	DEVELOPMENT & ENGINEERING	CATALOGING & STANDARDIZATION	NEW EQUIPMENT TRAINING TRAINING AIDS TECHNICAL ASSISTANCE	PROCUREMENT PRODUCTION INDUSTRIAL READINESS	INVENTORY CONTROL POINT	MAINTENANCE POINT?		
CHEMICAL AGENTS & MUNITIONS		EDGEWOOD ARSENAL					AMMUNITION PROCUREMENT AND SUPPLY AGENCY			
CHEMICAL PROTECTION & DETECTION SYSTEMS										
CHEMICAL DETECTION & WARNING										
BIOLOGICAL AGENTS & MUNITIONS		FORT DETRICK								
BIOLOGICAL DETECTION & WARNING SYSTEMS										
NUCLEAR MUNITIONS		PICATINNY ARSENAL								
CONVENTIONAL AMMUNITION										
WARHEAD SECTIONS										
SMALL CALIBER MUNITIONS		FRANKFORD ARSENAL								
PROPELLANT ACTIVATED DEVICES										
FIRE CONTROL										
									U. S. ARMY WEAPONS COMMAND	

FIGURE 4. MISSION ASSIGNMENTS, APSA

Source: U.S. Army Munitions Command Brochure, The Management of Munitions, undated.

AMMUNITION

(2) Within its overall mission as the NICP for munitions, APSA developed the basic data for the munitions budget. The dynamic changes subsequent to January 1965 in the computation of requirements, methodology of budget preparation, and organization will be treated in Chapter IV.

(3) As denoted in Figures 3 and 4, APSA was both the National Inventory Control Point and the National Maintenance Point for munitions. Included in the mission of this agency was the overall responsibility for procurement, production, industrial mobilization planning, wholesale inventory management, supply control, and other assigned related tasks, involving stock control, storage, distribution, surveillance, and depot maintenance.² The Ammunition Procurement and Supply Agency also directed and controlled 8 active and 16 inactive Army ammunition plants.³ These 24 plants were all in the Government-owned contractor-operated (GOCO) category. As of 1 January 1965, the 8 active plants were not fully utilized, in that not all of the available production lines at each plant were actually in operation, and those in use were for the most part operating at minimum sustaining rates.

(4) The private industry sector of the munitions production base consisted of approximately 240 Base Production Units assigned to about 180 private concerns. Of the Base Production Units, 51 were actively producing munitions components on 1 January 1965.

(5) The response of this production base, as it developed to meet the challenge of the inordinate demands of the Vietnam buildup, was noteworthy in the light of the condition of the base, the lack of response of designated base producers, and the emphasis on maximum competitive procurement. How the obstacles were overcome and at what cost are subjects that will be addressed in Chapter V.

(6) This production base was augmented by 14 munitions depots under the direction and control of the U.S. Army Supply and Maintenance Command, an activity coequal to MUCOM in the AMC organization. These munitions depots were scattered throughout CONUS and had a total storage capacity of 4,465,000 short tons. They contained more than 3,000,000 short tons of munitions on 1 January 1965. Although no munitions production was accomplished under the depot mission, all surveillance, renovation, and modification of munitions was accomplished at these depots under the direction of APSA.

3. NAVY MUNITIONS LOGISTIC SYSTEM

a. General

(1) The Navy also relied on a self-sufficient ammunition logistic system oriented toward the support of the Atlantic and Pacific Fleets, with the dividing line between geographical areas of responsibility lying in the western part of the Indian Ocean. Unlike the Army support doctrines, however, the support doctrines for these two fleets were essentially uniform and were conceived to maintain the mobility and flexibility of the operating forces in any part of the world. Primary reliance was placed on Underway Replenishment Forces support by a limited number of strategically located overseas storage areas and backed by the primary base in the continental United States.

(2) A second feature of significance was the multitude of weapons requiring support because the Navy's mission involves offensive and defensive operations on land as well as on, over, and under the seas. Submarines can lay mines, fire one type of torpedo against enemy submarines and another against surface ships, and in some cases even launch POLARIS missiles in a nuclear exchange. Gun ammunition is required by surface ships in an antiship and antiair role as well as in support of amphibious operations and landed troops in coastal areas. Surface

²U.S. Army Ammunition Procurement and Supply Agency, subject: USAAPSA Responsibilities, Organization, and Operations, 1 January 1965-30 June 1967, p. 5.

³Army, Deputy Chief of Staff, Logistics, Memorandum, to Lt. Gen. O. E. Hurlbut, JLRB, subject: Ammunition Logistics in Support of the Southeast Asia Operations 1965-1968, 5 September 1969.

AMMUNITION

ships can also lay mines, launch antisubmarine torpedoes, and employ surface-to-air missiles in support of the fleet. Carrier aircraft use a variety of bombs, rockets, flares, missiles, and, in some configurations, mines and torpedoes as well. In addition, the Navy was providing all of the ordnance used by Marine Corps aircraft.

(3) The Navy organization for ammunition management extended through two channels. The first supported the fleet commands, controlled by the fleet commanders in chief under the Chief of Naval Operations (CNO) and was concerned with the operational aspects of logistics. The second concerned itself with material logistics and was controlled by the Chief of Naval Material (CNM).

(4) The CNO stated the qualitative and quantitative requirements of the operating forces to the CNM. These requirements were expressed either in specific numbers of end rounds or in general terms, deemed appropriate by the CNO. The Chief of Naval Material implemented the program after receiving and evaluating the requirements with the CNO in terms of financial and procurement feasibility.

(5) The relationship in existence in 1965, as it applied to the organization for the management of ammunition, is shown in simplified form in Figure 5.

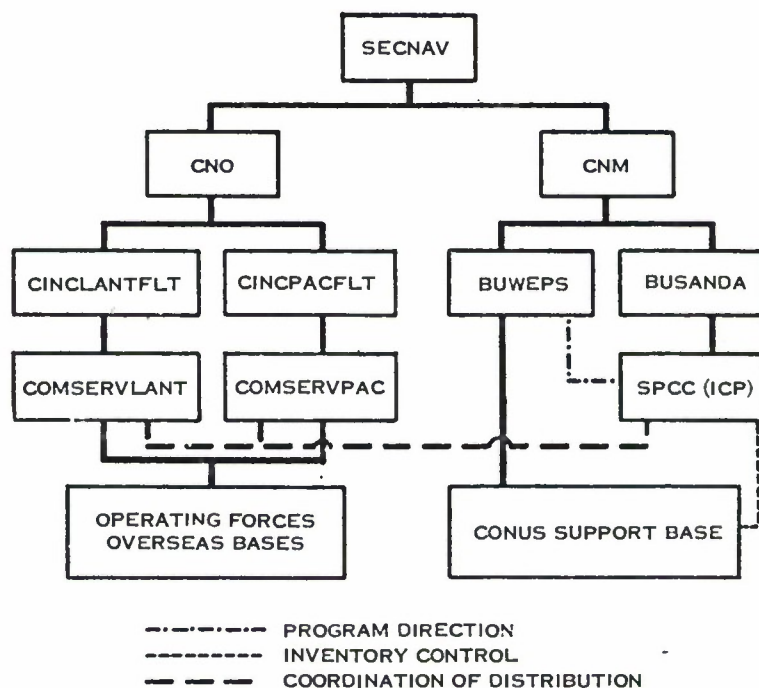


FIGURE 5. U.S. NAVY ORGANIZATION FOR THE MANAGEMENT OF AMMUNITION

Source: U.S. Navy, CNO, Memorandum Serial 914P41, subject: Ammunition Logistics During the Vietnamese War 1965-1969, 5 August 1969.

AMMUNITION

(6) One of the salient points to be noted is that in the operational chain all munitions assets are allocated to and managed by the Commander in Chief, Atlantic Fleet (CINCLANTFLT), and Commander in Chief, Pacific Fleet (CINCPACFLT), in a manner similar to that in which the operating forces are assigned to one or the other of these Commanders. Although operational control of certain forces, such as the Sixth Fleet, is passed to the Commander in Chief, U.S. Naval Forces, Europe (CINCUSNAVEUR), military command of the forces constituting this fleet is vested in CINCLANTFLT. Their logistic support follows the same pattern. As a consequence, although war reserve stocks are pre-positioned in the European area in support of NATO and national contingency plans, they remain part of CINCLANTFLT's resources unless otherwise directed by the CNO. Similarly, CINCPACFLT, as the Naval Component Commander in the Pacific theater, controls the munitions resources allocated to him by the Chief of Naval Operations for support of assigned forces.

(7) Another item of note was the leading role played by the Service Force commanders who, acting as the principal logistic agents under their respective fleet commanders in chief, were essentially responsible for the management of all facets of conventional munitions logistics within the fleets. At the time of the Gulf of Tonkin incident, the Commander, Services Forces, Pacific (COMSERVPAC), was assigned ammunition distribution responsibilities which formerly, under peacetime conditions, had become fragmented among a number of commands. On 1 January 1965, Naval Magazines and Ordnance Facilities in Guam, Japan, and the Philippines had been placed under the command of COMSERVPAC. Very early in 1965, then, all logistic means--both afloat in the form of Underway Replenishment Forces and ashore in the form of overseas receipt, storage, and issue points--were placed under a single commander.

(8) With respect to the material organization, it is of interest that in January 1965 the Chief of Naval Material had a direct line to the Secretary of the Navy and, in addition, to the Chief of Naval Operations. This was the so-called bilineal organization then in effect. Under the Chief of Naval Material, the Chief, Bureau of Naval Weapons (BUWEPS), was charged with the technical and material management of ordnance matters for both aircraft and ships. The reorganization of 1 May 1966 disestablished the bilineal organization by placing both operational and material chains directly under the CNO. It also split the BUWEPS into two commands: the Naval Ordnance Systems Command (NAVORDSYSCOM), which exercised management cognizance over gun ammunition, and the Naval Air Systems Command (NAVAIRSYSCOM), which managed air munitions. Also to be noted is the fact that the ICP for ammunition, Ships Parts Control Center (SPCC), Mechanicsburg, did not fall into the direct chain under the Bureau Chief having ammunition cognizance, as had been the case in prior wars, but instead came under the command of the Chief, Bureau of Supplies and Accounts. This step was taken by the Navy in March 1964 in order to consolidate the number of existing ICPs to the extent practicable by combining along functional vice command lines. Prior to that time inventory management of ammunition had been exercised by the Ordnance Supply Office (OSO).

b. Operational Logistics

(1) The Chief of Naval Operations is responsible for determining the operational logistic requirements. These responsibilities are divided into two categories: procurement and distribution. Procurement requirements are based on the future needs (two or more years) of the Navy and are used for budgetary purposes. Distribution requirements are based on the allocation and distribution of ammunition assets in the inventory. The basic planning document from which both sets of requirements were developed was the Navy Non-Nuclear Ordnance Study (NNOS, or Connally Study), which was initially produced in 1963 and updated annually. This was the predecessor to the current Non-Nuclear Ordnance Requirements (NNOI).

(2) In its application to the budgetary process, the Navy NNOS interfaced with the Secretary of Defense's Logistics Guidance which contained the procurement policies of the Secretary of Defense based on approved strategies and force structures. This guidance, issued on 28 August 1963, governed the procurement program for combat consumables for FY 65.

(3) The Naval Material Command, through the Bureau of Naval Weapons (later NAVORDSYSCOM/NAVAIRSYSCOM), developed specific procurement quantities for each budget

AMMUNITION

line item consistent with approved procurement guidance. These programs were designed to support all forces in the Department of the Navy Five-Year Program (DNFYP) at authorized levels. In developing these requirements, the NNOS was used as the planning document for computation of the 90-day reserve for surface forces and for the load factors and weapon mix associated with authorized aircraft sorties.

(4) In the application of the NNOS to allocation and distribution requirements, the CNO required the fleet commanders in chief to apply NNOS planning factors to current force levels and current weaponry available in the inventory, projecting them for one year. The concept was that the fleet commanders in chief (CINCLANTFLT and CINCPACFLT) would compute 90 days of requirements to be considered as Pre-positioned War Reserves Requirements (PWRR) which, in turn, were over and above the ammunition allowed for shipfills (shipfills being initial allowance for the service of ships own armament and embarked aircraft). After requirements were computed, a fair-share plan was developed. In this plan, the requirements of each fleet commander in chief for shipfills, 3 months of training and 90 days of PWRR, were added together and compared to develop fair-share ratios; and the assets thus available and/or expected to enter inventory were allocated in accordance with this proportion. In early 1965, this allocation was approximately 40 percent to the Atlantic Fleet and 60 percent to the Pacific Fleet, or roughly in proportion to their respective sizes. As previously noted, PWRR stocks to be stored in the European area were included in the Atlantic Fleet share. Once the assets were allocated, a fleet commander in chief could decide the interfleet distribution, electing whether to satisfy all initial fill requirements completely. In any event, the proportion of the assets that he allocated to PWRR must remain untouched except for any necessary turnover, unless authorization to do otherwise was received from the Chief of Naval Operations. Code names for these special CNO projects were as follows:

- (a) HURRICANE: 90 days of combat support for LANT/MED (less USMC Class V(A)).
- (b) TYPHOON: 90 days of combat support to PAC (less USMC Class V(A)).
- (c) CLOUD: 90 days of Class V(A) for FMFLANT (mount-out plus two resupply increments).
- (d) STORM: 90 days of Class V(A) for FMFPAC (mount-out plus two 30-day resupply increments plus a 15-day Class V(A) mounting-out augmentation for deployed units only).

(5) Ammunition stocks remaining in CONUS were treated in three categories: Pre-positioned War Reserve Stocks (PWRS), Fleet-Issue-Controlled (FIC) items, and operating stocks. The first category, PWRS, constituted the portion of the overall PWRR that fleet commanders elected to be held in CONUS storage (a maximum of 60 days of the 90-day PWRR was authorized for storage at overseas bases). These stores were held under the same ground rules as any other PWRR. The FIC items were those in which assets available to a fleet commander in chief were inadequate to satisfy all his requirements and whose allocation to shipfills and training were controlled by him through his Service Force commander to ensure the most effective use. The third category, operating stocks, simply constituted a pool of assets utilized by the ICP to replenish withdrawals from storage points.

(6) "The Navy's ammunition distribution concept is based essentially on the premise that items required by the Fleet would be available when and where they were needed without either undue delay or long trips to supply points for replenishment. This system is comprised of ammunition ships (AEs/AOEs) which carry diversified loads for underway replenishment of combatants in forward areas, coastal depots, inland bulk storage depots and overseas bases where pre-positioned war reserve stocks are stored and maintained."⁴

⁴Naval Ammunition Depots and Weapons Station, Report of the Naval Ammunition Depots and Weapons Station Study Group (U), 1 September 1965 (CONFIDENTIAL).

AMMUNITION

(7) In January 1965, the conventional ammunition distribution system operated primarily as a "pull" system. For noncritical items, ships in CONUS waters submitted requisitions direct to the nearest Navy coastal ammunition stocking activity, whereas deployed units and overseas bases requisitioned through COMSERVPAC and COMSERVLANT, as appropriate.

(8) "In the Pacific, the primary channel of Service Force support of the SEVENTH Fleet was via Commander, Service Group THREE, to whom mobile support ships and units were assigned. Commander, Service Group THREE, and most of the forces assigned to him were under the operational control of the Commander, SEVENTH Fleet, to whom he reported as Commander, Mobile Support Force (CTF 73). The arrangement was highly effective."⁵

(9) Inherent in the effective management of both operational and materiel logistics is an efficient reporting system through which the actual status and location of ammunition assets can be ascertained. On 1 January 1965, the following ammunition reports were being prepared:

(a) Quarterly World-Wide Ammunition Asset and Expenditure Report by Department of Defense Identification Code (DODIC) on all items having assets.

(b) CNO Readiness Z Number Report (Quarterly), prepared from selected items in Z number sequence (an index number arbitrarily assigned to total like ammunition). This report covered 76 end-items.

(10) Fleet units and overseas depots reported directly to SPCC, Mechanicsburg, by mail. Service Force commanders only monitored this information and kept records by hand or by means of rudimentary computer systems. The CONUS information was reported daily to SPCC by CONUS depots and major air stations under the Transaction Item Reporting (TIR) system with each activity involved nightly transceiving the preceding day's transactions, such as issues, receipts, and changes in condition code. Computerized worldwide summaries prepared by SPCC became available to OPNAV and Bureau Management levels some 45 days after the close of the reporting quarter. Furthermore, no system existed for tracking assets that were in transit outside CONUS—or even in CONUS if the assets came directly from a producer and had not been taken up in stock by a depot. As a result, production assets dropped out of sight and often never surfaced in inventory reports.

c. Material Logistics

(1) Backing up the operating forces and overseas bases was the naval ordnance support system.

(2) Because of the peculiarities of ordnance, it had been found necessary through experience in prior wars to establish a separate naval ordnance support system to provide expendable ordnance to the operating forces. Although some of the fundamental policies and procedures that governed the operation of the Navy Supply System also applied to the operation of the naval ordnance support system, there were fundamental differences. First, the tremendous increase in wartime ammunition requirements precluded the computation of ammunition stock objectives on the basis of peacetime supply and demand. Second, the hazards inherent in handling, storing, and maintaining explosive materials created many apparent differences and some not so apparent. For example, even though most ordnance was identified and managed through the Federal Stock Number System, it was also necessary to maintain inventory records by Lot Number to provide the basis for the Navy-wide quality evaluation and rework program and to provide the controls necessary to withdraw or suspend from use lots of ammunition which become unserviceable or dangerous.

(3) Included as an integral part of the logistic support shore establishment were the Naval Ammunition Depots, Naval Weapons Stations, and the POLARIS Missile Facilities. The

⁵Address by Rear Adm. E. B. Hooper, USN, at Naval War College, 30 March 1967.

AMMUNITION

main purpose for their existence was to provide the fleet with its required ammunition, missile, and other ordnance capability. Fleet operational considerations and other considerations necessitating ordnance support activities included:

(a) Coastal Activities—located near the geographical areas where surface and air logistic support services were furnished the fleet, especially in areas where significant numbers of ships were homeported or concentrated. Pre-positioned war reserve stocks were stored and maintained as well as sufficient versatile storage to provide uninterrupted delivery to the forces afloat from the inland support sources. In addition, on the east coast the Naval Ammunition Depot, Earle, and on the west coast the Naval Ammunition Depot, Bangor, and the Naval Weapon Station, Concord, performed ammunition outloading for Army and Air Force as well as Navy. These three activities were specifically designed and built for transshipping large quantities of ammunition as cargo. On the west coast, the two Navy depots comprised the total DOD capability for ammunition cargo outloading. The Army had an active transshipping terminal at Sunny Point, North Carolina, and an inactive terminal at Kings Bay, Georgia.

(b) Inland Activities—dispersed to provide and sustain weapons and ammunition support to coastal and overseas locations. Their essential functions consisted primarily of providing storage and ammunition loading and assembly capability and performing special assignments (such as renovation, rework, quality evaluation, and RDT&E).

(c) Overseas Activities—located in strategic places around the world where primary fleet operating forces are situated to meet readiness and responsiveness requirements in both peace and war. Their capability included the receipt, storage, maintenance, and issue of ammunition; the pre-positioning of stocks for contingency purposes; and the overall ammunition support to the fleet for both operational and training purposes.

(4) Figure 6 illustrates the geographic distribution of the 15 shore activities comprising the naval ordnance support system that were under the primary support of the Bureau of Naval Weapons (later the Naval Ordnance Systems Command). Primary support for the overseas locations was to revert to CNO on 1 July 1967, while command remained vested in the fleet Service Force commanders.

(5) Since the Korean War, the Navy's procurement and production policy has been based on the following concepts:

(a) Most inert items and components were procured from commercial sources following the provisions set forth in the Armed Services Procurement Regulations (ASPRs). Except for the small production capability at the Naval Ordnance Station, Indian Head, and for the propellants for various guided missiles and torpedoes, explosives and propellants were procured through the Army, which acted as the single Service manager for these commodities.

(b) Most new ammunition items were explosive-loaded and assembled at existing specialized Government-owned and -operated ammunition inland depot facilities. Some workload was rotated among those activities having dual production facilities to maintain ready production capabilities in the event of an emergency.

(c) Most new ammunition items were loaded and assembled at inland activities and shipped to coastal depots to fill ships' allowance loads, cargo loads, and overseas pre-positioned stocks; or retained for mobilization stocks for subsequent replenishment issue to fleet units and as backup stocks for contingency plans.

(d) Inventory management control was exercised by the Ships Parts Control Center (SPCC), Mechanicsburg, under the command of Bureau of Supplies and Accounts (BU-SANDA) and with the technical guidance and direction of Bureau of Weapons (BUWEPS) for ordnance matters.

(6) The SPCC was designated as the ICP in March 1964 for all types of Navy ammunition and ordnance material except certain guided missile and underwater ordnance items.



FIGURE 6. NAVAL ORDNANCE SUPPORT SYSTEM

Source: Report of Naval Ammunition Depots and Weapons Station Study Group, 1 September 1965 (CONFIDENTIAL).

Inventory control for the latter was retained in BUWEPS or assigned to BUWEPS' field activities either because of the unusually specialized nature of the item or because of the rapid technological changes still taking place in these weapons. Because of the specialized and rapidly changing nature of the requirements determination process in the area of expendable ordnance, the basic requirements were determined by the CNO. For SPCC controlled items, these were translated by BUWEPS into a suitable form and transmitted to SPCC for appropriate action.

(7) The SPCC maintained inventory control records on all types of naval ordnance and ammunition throughout the Navy, including ship, squadron, and station allowances as well as ammunition ships and tender loads. In conjunction with BUWEPS, SPCC controlled the ordnance maintenance workload at all ordnance activities for assigned material and, at the direction of BUWEPS, procured ordnance material. Guided missile and most underwater ordnance items were similarly managed by BUWEPS. It should be noted that the Service Force Commanders exercised varying degrees of inventory control over stocks within their geographic areas of responsibility and within the Navy-wide framework of inventory control. For example, COMSERV-PAC, operating as CINCPACFLT's principal logistic agent, exercised virtually autonomous control over allowances, stock levels and issues at his overseas activities in exactly the same way that he exercised similar control over ammunition stocks carried in ammunition ships and tenders. The Service Force commanders placed requirements on the naval ordnance support system (BUWEPS or SPCC) for material that was not available within deployed or area stocks, but which may have been available elsewhere in the system. Fulfillment of these requirements was subject only to the availability of material and to the need for fair-sharing between the two fleets, in accordance with the CNO policies. Although NAVORDSYSCOM and NAVAIRSYSCOM were substituted for BUWEPS, few major changes took place in the above system during the Vietnam conflict.

4. MARINE CORPS MUNITIONS LOGISTIC SYSTEM

a. General. The Marine Corps ammunition logistic system, concept of ammunition logistic support, and attendant ammunition support organization and technique of employment are designed for conducting amphibious operations under limited and general war conditions. As of 1 January 1965, the Marine Corps ammunition logistic system was in a state of readiness for planned and unplanned tasks, including forward deployments, an ammunition logistic organization tailored to the amphibious mission, and a system of pre-positioned ammunition stocks and initial automatic resupply for committed units. The Marine Corps worldwide ammunition logistic support concept was in consonance with the FY 64 Secretary of Defense guidance, which called for the stockage of 20 division months of ammunition for ground forces and 16 wing months for air units, either in the hands of troop units or in Navy and Marine Corps ammunition storage facilities, to support 6-months of combat without reliance on other sources.

b. Organization. The Commandant of the Marine Corps was responsible for management of Marine Corps worldwide ammunition. Ammunition policy was formulated and promulgated by his office under the staff supervision of the Deputy Chiefs of Staff (Logistics) and (Air) for ground and air munitions, respectively. This office had a dual assignment, one relating to the Commandant of the Marine Corps, the other to the Chief of Naval Operations, who was responsible for the management of air munition items required for support of the air element of the Marine Corps Fleet Marine Force. Except for aviation, ammunition management within the Marine Corps paralleled the command structure and was included as an element of logistic management. The basic structure followed two identifiable channels, both of which emanated from Headquarters, U.S. Marine Corps. The first was applicable to the operating forces and passed through the Commanding Generals of the Fleet Marine Forces (FMF) to the Commanding Officers of Combat, Combat Support, and Combat Service Support units. The second channel was applicable to the supporting establishment and passed directly from the Commandant of the Marine Corps to the Commanding Generals of Marine Corps bases. This organization is shown in Figure 7.

c. Operational Logistics

(1) Worldwide requirements were developed in accordance with the Logistics Guidance published by the Secretary of Defense, which authorized the maintenance of mobilization reserve stocks of ammunition for 20 Division months and 16 Wing months of combat. This total quantity was expressed as an inventory objective for each item of ammunition to support 5 months of combat for each of four divisions.

(2) The inventory objective was derived by applying predicted ammunition expenditure rates to the weapon densities of Marine Corps organizations. These rates were developed specifically for use in general mobilization and were developed on the basis of a study that considered possible commitment of Marine Forces in several areas of the world, probable targets, areas to be covered, effectiveness or lethality of ammunition, and mix of weapons.

(3) Requirements were validated during their incorporation into Material Planning Studies. These studies contained the then current and projected requirements data in response to the Secretary of Navy Instruction 4000.5 and Secretary of Defense Secret Memorandum to the Secretary of the Navy, dated 28 August 1963, as amended.

(4) Marine Corps air ammunition requirements were developed by the Chief of Naval Operations in coordination with the Commandant of the Marine Corps. The basic document from which these requirements were developed was the Non-Nuclear Ordnance Requirements.

(5) Ground ammunition assets were allocated in accordance with basic allowance and mount-out requirements.

(a) Basic Allowance. The basic allowance (that quantity required to effect initial distribution within units prior to entering combat) was earmarked, stored, and maintained in

AMMUNITION

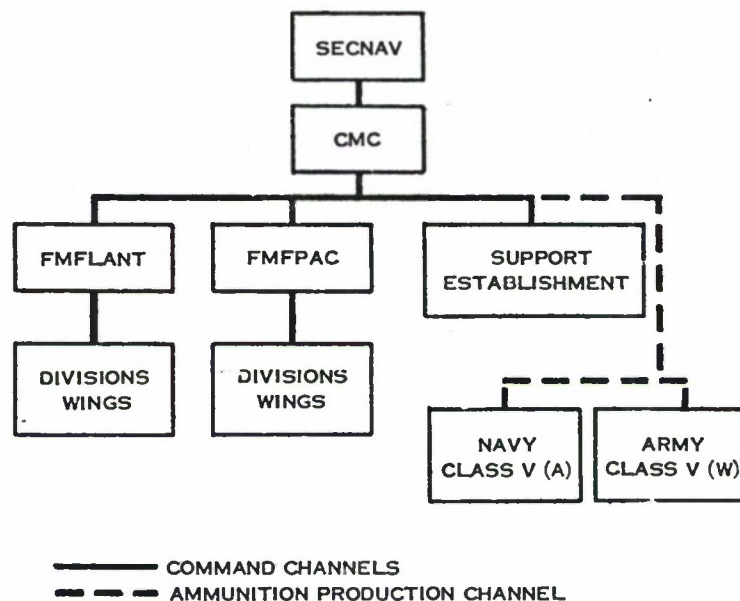


FIGURE 7. U.S. MARINE CORPS SIMPLIFIED ORGANIZATION CHART

Source: U.S. Marine Corps, CMC, Memorandum C911543, subject: Ammunition Logistics in Support of SEA Operations, 1965-1968, 1 August 1969.

the closest proximity to FMF units. The basic allowance was issued directly to troop units at their respective base locations upon being ordered to embark. Responsibility for withdrawing, issuing, and loading the basic allowance rested with the respective unit commander.

(b) Mount-out Stocks. Mount-out stocks consisting of a 30-day supply of ammunition at the combat assault rate (D-Day to D+30) and a mount-out augmentation stock consisting of a 30-day supply at the extended operational rate (D+30 to cessation of combat) were maintained in close proximity to the unit's location. 1st and 2d resupply, each composed of 30 days of ammunition at the extended operational rate, were stored in CONUS depots and earmarked for specific units. Of total mount-out stocks, certain quantities were earmarked and positioned for designated FMF units in accordance with Logistic Readiness Projects, CLOUD and STORM. These stocks were a ready source of Class V supplies to meet requirements of commanders ordered to conduct an operation either in conjunction with the above projects, or by other specific initiating directives. The assets of projects CLOUD and STORM were controlled by the Commandant of the Marine Corps and released for issue upon request of FMF Commanders.

(6) Marine Corps air ammunition assets were allocated by fleet commanders based on operational requirements and a fair-share basis.

d. Material Logistics

(1) The Marine Corps did not have production capability and relied on the Army in-house production capability for the majority of its ground ammunition requirements, procuring them via Military Interdepartmental Purchase Requests (MIPRs). The Navy in-house production capability provided all Marine Corps air munition requirements as well as certain Marine Corps

AMMUNITION

peculiar ground ammunition items. The procuring service was responsible for consolidating all Marine Corps requirements and maintaining or establishing the necessary production base.

(2) The management and control of Marine Corps ground ammunition was a function of the Commandant of the Marine Corps. The Chief of Naval Operations, in coordination with the Commandant of the Marine Corps, was responsible for the management and control of Marine Corps air munitions.

5. AIR FORCE MUNITIONS LOGISTIC SYSTEM

a. General. On 1 January 1965 the Air Force logistic system was tailored to the concept that the inherent range and flexibility of air power would allow use of existent bases for combat operations. In the event this concept proved impractical, because of the location of the combat zone, it was envisioned that aircraft, crews, and limited support personnel would be deployed to a forward operating base, in or near the combat zone on a rotational basis. An established base would furnish required expendable supplies and perform all major maintenance on aircraft. Therefore, ammunition requirements were provided by prestocking sufficient assets at each tactical air base to meet initial combat expenditures rather than by using overseas depots. Stockage levels were set at 60 days for European bases and 90 days for Pacific bases, based upon the forecast replenishment time from CONUS reserve stocks. As a holdover from the time it was part of the Army, the Air Force relied upon the Army for ammunition production and CONUS storage. The Air Force logistic system was structured to support these concepts of operation.

b. Organization

(1) To trace the ammunition logistic system of the Air Force, it will be necessary to examine each organizational echelon, and its responsibilities and duties in relationship to the total system. Below the Headquarters level, the Air Force is basically organized into a number of specified, component, and support commands. The single specified command, Strategic Air Command, and the component commands, such as the Pacific Air Forces and Tactical Air Command, carry primary operational responsibilities for the Air Force.

(2) The support command directly charged with material support of the Air Force is the Air Force Logistics Command (AFLC). The mission of the AFLC, as specified in Air Force Regulation 23-2, is to "Perform logistic management functions, including determining quantities, material requirements, buy/budget programs, inventory control, storage and distribution." The operating agencies of the AFLC are five Air Materiel Areas (AMAs). The AMAs perform inventory control point functions as well as the purchasing, storage, and distribution of centrally procured stocks. In addition, the AMAs provide technical assistance in their fields of prime responsibility. In accordance with AFLC Regulation 23-50, Ogden Air Materiel Area (OOAMA) is the AFLC agent for ammunition items, and Warner-Robins Air Materiel Area (WRAMA) is responsible for guns, gun systems, and air launched missiles.

(3) In the operational organization, the Pacific Air Forces (PACAF) is a major command reporting directly to the Chief of Staff, USAF, but is under the operational control of the theater commander, CINCPAC. Logistic support channels are direct to AFLC. On 1 January 1965, PACAF was organized into two numbered Air Forces: the Fifth AF in Japan, with bases in Japan, Korea, and Okinawa; and the Thirteenth AF in the Philippines with bases in the Philippines, Taiwan, Thailand, and Vietnam. A subordinate unit of the Thirteenth AF, designated the 2d Air Division (AD), was located at Tan San Nhut in Saigon and controlled the limited in-country air commando effort. This organization is shown in Figure 8.

c. Operational Logistics

(1) In early 1965 ammunition requirements for SE Asia forces were determined by PACAF, in conjunction with the Thirteenth AF and the 2d AD, based on a study of past consumption and tempered by the availability of specific items from CONUS depot stock. From this computation, PACAF Letter 136-2 was published, listing desired 120-day stock levels for Clark AB, the main support base for all Air Force units in Vietnam. Once a month, Clark AB

AMMUNITION

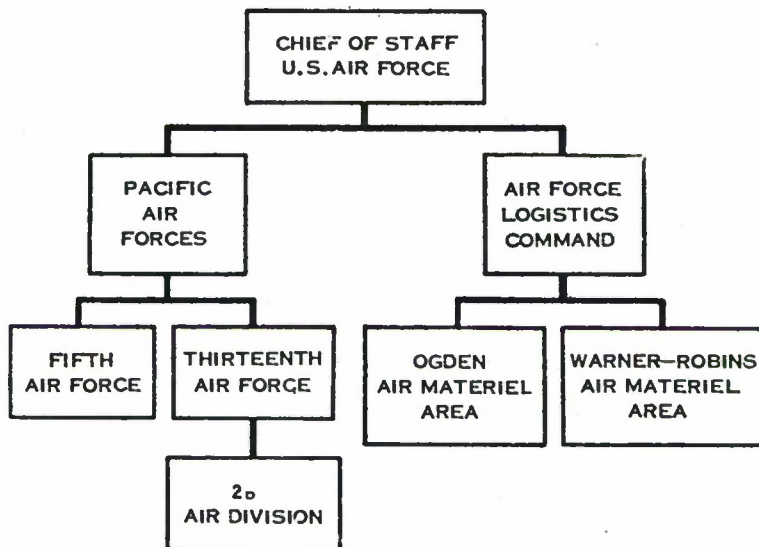


FIGURE 8. U.S. AIR FORCE SIMPLIFIED ORGANIZATION CHART

Source: U.S. Air Force, AFSSS Letter, subject: Munitions Logistics During the Vietnam Conflict, 1965-1968, 16 September 1969.

requisitioned against these levels directly from the Inventory Control Point (ICP) at OOAMA. Responsibility for maintaining 30 days of stock in country rested with the Thirteenth AF, which directed stocks from Clark AB to Vietnam on a "push" system. When filling requisitions, the Air Force ICP would occasionally direct shipment from another Air Force base, but the normal procedure was to fill them from depot stock. The Air Force, however, did not have CONUS munitions depots—they were all owned and operated by the Army or Navy. Therefore, most requisitions were passed to the Army or Navy ICP, who directed the appropriate depot to provide the desired items. It should be noted that requisitioning was complicated by the fact that munitions were neither requisitioned nor shipped as complete rounds. It was necessary to individually requisition the bomb body, fin, boosters, delay elements, fuzes, arming drives, arming wires, loops, swivels, and clips necessary to assemble a usable bomb.

(2) In summary, no formal requirements determination procedure was used by the operational units; higher echelons established requirements based on past consumption and asset availability. Requisitioning techniques followed the peacetime techniques suitable for filling training needs; however, this was not adequate for wartime expenditure.

(3) Distribution techniques also followed peacetime practices. Most munitions destined for ultimate use in SE Asia were shipped to Clark AB, the home base of the tactical aircraft deployed to Vietnam. Explosive components were shipped to the Navy facility at Subic Bay and trucked to Clark AB. Inert components, such as fins and arming components, were usually shipped as general cargo to avoid premium explosive shipment rates and, therefore, would arrive through the port at Manila. When ammunition was called forward by units in Vietnam, it was brought back to Subic Bay and transshipped by shallow-draft ships to Nha Be or Da Nang. Both these ports depended on Vietnamese barges to move the munitions from the ships to offload docks, from which they were trucked to their final destination. This complex system involved a pipeline time of 270 days. Further problems were also beginning to appear as the tempo of the war increased as a result of the Gulf of Tonkin incidents in late 1964. The inflexibility of the system, the growing shortage of specific assets at Clark AB, the increased congestion at Subic

AMMUNITION

Bay, and the low throughput capability at Vietnamese ports presaged the major problems yet to come.

(4) Ammunition asset reporting in 1965 relied on the HAF S-18 reporting system (nicknamed the S-18), prescribed by AF Regulation 67-79, and its products provided by the Ammunition Asset Reporting Sub-System, designated D023A. Under this system, all USAF munitions activities submitted reports by mail each month to the ICP at OOAMA. These reports covered all transactions such as receipts, issues, consumption, and serviceability changes on approximately 1700 ammunition items. These manual feeder reports were keypunched at OOAMA for machine processing. More than 30 different computer outputs are generated each month, varying by sequence or content, to meet the needs of managers at all echelons.

d. Material Logistics

(1) It has been previously noted that stockage objectives for SE Asia forces were predicated to a large extent on availability of assets in CONUS storage. These stocks contained some new munitions, but were predominantly surplus items left over from the Korean War and World War II. These items were separated into three categories: Peacetime Operating (PTO), War Readiness Materiel (WRM), and Southeast Asia (SEA).

(2) The PTO requirements were computed in the categories of Air National Guard, Base Defense, Operational Support, Mission Support, and Training, using applicable program directives, regulations, and past experience in consumption. This computation was performed by the Item Managers (IMs) of each involved type of ammunition at OOAMA and reviewed initially at a joint Air Staff and AFLC meeting and subsequently by various boards within the Air Staff, such as the Program Review Committee and the Air Staff Board. A final review was conducted at the Secretary of Defense level in conjunction with the Air Staff.

(3) War Readiness Materiel was defined as that level of munitions required to implement the Logistics Guidance and support the forces approved by the Secretary of Defense. In early 1965, WRM stocks were still considered inviolate—reserved for general war or major contingency plans—and were not releasable for Southeast Asian expenditure. The FY 65 Logistics Guidance, promulgated by the Secretary of Defense in late 1963, authorized the Air Force to procure sufficient modern ordnance for 90 days of combat. This was to be predicated on the 1 July 1969 authorized force, and procurement was to be spread across a 4-year period. Support of an additional 90 days of combat using older types of ordnance was also directed. Air Force plans called for positioning a 60-day supply of ammunition in Europe and a 90-day supply in the Pacific. The remainder of the WRM assets were to be stored in Army depots in the continental United States.

(4) Computation of the specific munitions buy to support the Logistics Guidance had been accomplished, prior to the FY 65 program, by AFLC. Requirements were determined for each type of munition by multiplying the appropriate program (aircraft type and quantity) by the sortie rate (number of missions each aircraft will fly) by the expenditure factor for the specific munition. This procedure provided a gross requirement from which on-hand assets and those due in from production could be subtracted to arrive at a buy position. Programs and sortie rates were provided to AFLC by Headquarters, USAF, in standard programming documents, such as the USAF Wartime Guidance, Program Guidance, Air Force Logistics Guidance, and Wartime Unit Aircraft Activity. The expenditure factors for specific munitions—that proportion of the total requirement made up by each munition type—were developed within AFLC. Starting in late 1963, computations of WRM requirements were made by the Air Staff rather than AFLC because of numerous reprogramming actions directed by both the Air Staff and the Office of the Secretary of Defense.

(5) Actual management of munition assets was vested in the Inventory Managers (IMs) at OOAMA. The Air Force relied on the Army and Navy in-house production capability for the majority of its conventional munitions, procuring them via Military Interdepartmental Purchase Requests (MIPRs). The procuring Service was then responsible for consolidating all requirements and maintaining or establishing the necessary production base. The Air Force did

AMMUNITION

procure metal parts for certain Air Force peculiar munitions from commercial sources, but relied on the Army and Navy (via MIPR) for all explosive loading, assembly, and packing.

(6) Once an item was produced the IM was responsible for its distribution. If munitions were not immediately needed at an Air Force installation, they were shipped to an Army depot for storage. Distributions from production or from the stocks at Army depots were directed by the IM to meet the requirements of requisitions. The IM was also responsible for maintaining inventory data gathered through the S-18 reporting system.

(7) In summary, because the Air Force was not responsible for Government-owned production facilities or CONUS storage depots, the tasks of the IM were less complex than his counterparts in the Army or Navy. He was responsible, however, for initiating procurement, filling requisitions, programming distribution, maintaining inventory records, and providing a single point of contact for all supply matters relative to his assigned munition types.

6. CONTROLS ON SERVICE AMMUNITION LOGISTIC SYSTEMS

a. General

(1) The Secretary of Defense exercised his authority and overall control over munitions primarily through the Five-Year Defense Plan (FYDP), the annual issuance of Logistics Guidance, and the budget process, relying principally on the Assistant Secretaries of Defense, Comptroller, and Systems Analysis for this purpose, and procurement and industrial facilities control policies. These controls were to undergo major changes during the Vietnam conflict.

(2) The planning and programming system was a multi-step process involving repeated reviews. Within OSD alone, changes in ammunition programs required review by personnel in the offices of the Assistant Secretaries of Defense for Systems Analysis, Installations and Logistics, and Comptroller.

(3) In ammunition as well as other areas, "The Military Departments and Services continued to have responsibility under the direction of the Secretary of Defense for the logistic and administrative support of component commands."⁶ The relationship of the unified commanders was delineated in Chapter 3 of the Joint Chiefs of Staff Publication 2, where it was established that:

"The commander of a unified or specified command is authorized to exercise directive authority within his command in the field of logistics to insure effectiveness and economy in operations and the prevention or elimination of unnecessary duplication of facilities and overlapping of functions among the Service components of his command."

(4) This authority extended to the coordination, as necessary, for the acquisition, storage, movement, distribution, maintenance, evacuation, and disposition of materiel, with the provision that such coordination as is appropriate would be exercised through the commanders of the Service components and the commanders of other subordinate commands.⁷

b. The Unified Commands. As previously indicated, the responsibilities and authorities delegated to commanders of unified commands provided them with the necessary control to ensure effectiveness and economy of operations in their commands. Notwithstanding the directive authority delegated to the unified and specified commanders, this authorization was not intended to:

(1) Discontinue Service responsibility for logistical support

⁶JCS Publication 2, Unified Action Armed Forces, paragraph 30203. Also see Chapter 3, Volume II, of the JLRB Report.

⁷Ibid., paragraphs 30203 and 30602.

AMMUNITION

(2) Discourage continuation of techniques of coordination by consultation and agreement

(3) Disrupt effective procedures or efficient utilization of facilities or organization.

In fact, the policy governing the logistic functions of unified and specified commanders dictated that they utilize to the maximum extent the existing policies and procedures of the military departments, consistent with the assigned mission, to ensure that logistic functions continue as routinely as possible.⁸

c. U.S. Military Assistance Command, Vietnam

(1) During the early 1965 time frame when the U.S. involvement in Vietnam was basically restricted to support of the Republic of Vietnam (RVN) Forces, the Military Assistance Command Vietnam (MACV) functioned primarily in an advisory capacity.

(2) Although U.S. Forces engaged in combat support to the RVN Forces (through operations associated with the Air Force Farm Gate operation, the Army Support Command, and the 5th Special Forces activities) were consuming, directly and indirectly, considerable quantities of munitions in early 1965, MACV was not significantly involved insofar as logistic support to these operations was concerned. The munitions logistic support for these forces was furnished by the respective component commands of CINCPAC. Degradation of the political situation in Vietnam and the resultant deployment of U.S. combat units to Vietnam caused MACV to assume increased coordination in the field of munitions logistics.

7. THE CLIMATE OF JANUARY 1965

a. To adequately assess the climate of the U.S. defense establishment in January 1965, insofar as it relates to ammunition, it is necessary to trace the evolution of national strategic policy from the close of the Korean War. During the mid-1950s increased reliance was placed on nuclear capability to support the strategy of "instant and massive retaliation." The expansion of nuclear strike forces was emphasized. The Air Force received the major portion of the military budget not only to expand and modernize the Strategic Air Command but also to provide its tactical air fleet with nuclear arms. Although the Navy did not reduce its conventional warfare posture to the same degree, it did place major emphasis on the POLARIS submarine and the attack carriers with nuclear offensive capability. The Army and Marine Corps expended significant effort in the development of tactical nuclear missiles and artillery.

b. Because the policy of massive retaliation was ineffective in coping with such challenges to the national security as the Berlin Wall Crisis in 1961, defense policy again changed in favor of a more balanced conventional warfare strategic option.

c. Primary guidance for the increase in conventional warfare capability was contained in a memorandum from the Assistant Secretary of Defense (I&L) to his Service Assistant Secretary counterparts in late 1961. His instructions stated:

"In order to permit a wider choice of alternatives under a variety of possible conditions of war against a major power, an immediate objective of high priority will be to improve our conventional combat capability. This particular emphasis does not imply a decision not to use nuclear weapons. It is rather a determination to avoid sole reliance on nuclear weapons during an early period of extensive combat activity. It is intended to increase the range of alternatives, and to provide reasonable time and flexibility prior to resorting to nuclear warfare."⁹

⁸Ibid., paragraphs 30203 and 30602.

⁹Assistant Secretary of Defense (I&L) Memorandum to the Service Assistant Secretaries, subject: Procurement Guidelines and Objectives, 19 October 1961 (CONFIDENTIAL).

AMMUNITION

As the Services implemented these instructions, the period from August 1961 to January 1965 was marked by a slow but significant buildup in conventional warfare capability. Army strength was increased by two divisions, and both the Air Force and Navy obtained quantities of modern air ordnance of improved capability and compatible with jet aircraft.

d. The DOD Logistics Guidance for FY 66, promulgated in the fall of 1964, was to continue the philosophy of credible nonnuclear capability for limited wars of short duration with the maintenance of a strong nuclear posture for any major conflict. In general, the Services were directed to attain the capability to engage in a conventional war of 6 months duration. However, owing to budgetary limitations, they were not scheduled to attain this capability until the completion of the FY 68 buy, or 1 July 1969. The rationale for this delay was that although the likelihood of a war of more than 90 days or involving more than 1,000 aircraft was reduced, minimum cost options for such an eventuality should be pursued.¹⁰

e. To complete the 6-month requirement, the Air Force was directed in 1964 to retain sufficient older munitions for a second 90-day period. Similar guidance was given to the other Services. Navy ships were to be provided shipfills plus 90 days combat consumption for active and Category Alpha reserve and 30 days for Category Bravo reserve. Munitions were authorized to support Navy and Marine Aviation forces for a 6-month period. The Marine Corps was also to provide ammunition for its four divisions for 6 months. The Army was authorized a 6-month stock of ammunition for 8 NATO-oriented divisions, but D-to-P stocks (that quantity required to support operations from the onset of hostilities—D-Day—to the time when production equals consumption—P-Day) for the remaining 14 divisions.

f. In summary, in January 1965 the United States was planning to attain a capability by mid-1969 to effectively fight a conventional war for up to 6 months. Although the decision appeared militarily sound in light of the massive nuclear power of the United States, it did not consider the possibility of prolonged hostilities fought under severe political constraints and a strategy of gradualism, such as the war in Vietnam was to entail.

8. READINESS POSTURE

a. General

(1) Based on policies and guidance of the Secretary of Defense regarding inventory objectives, the assets of the Services, quantitatively speaking, appeared to be in a relatively favorable position in January 1965. Table 1 presents the percentages of selected inventory objectives each Service possessed at this time. Specific quantities are shown in Appendix D.

(2) From a qualitative point of view, however, there were weaknesses, stemming primarily from the obsolescent status and/or unserviceable condition of a significant portion of the stockpile, particularly air munitions.

(3) One contributing factor was the large number of remaining World War II and Korean munitions that were reflected as assets. This was due to the fact that in determining net procurement requirements, full application was made of all assets that could be assumed with reasonable probability to be available, including both serviceable and unserviceable ammunition and all acceptable substitute ordnance end-items. An awareness of the degree of obsolescence of some stocks by higher echelons was often obscured by the common usage of tons as a succinct measure of munitions stockage posture.

(4) A second factor was that some shortfalls resulted in certain newer weapons although the basic intent of the military departments' procurement programs was to achieve the Secretary of Defense's authorized inventory objectives. The shortfalls occurred because of one or more of the following reasons:

¹⁰Secretary of Defense, Memorandum to the President, subject: Recommended FY 1966-FY 1970 Air Force General Purpose Forces, 11 November 1964 (TOP SECRET).

AMMUNITION

- (a) Unavailability of adequate on-line production capacity.
 - (b) Judgment that maintaining a continuing production base was more desirable than early achievement of the requirement and subsequent reduction of the hot production base.
 - (c) Program limitation to an economical and prudent first procurement quantity.
 - (d) Judgment to await a superior weapon soon to be available.
 - (e) General constraints of financial resources.
- (5) Even though there is no evidence that the military department intentionally required, or the Secretary of Defense accepted, inventory objectives less than those prescribed by the Logistics Guidance in effect, it remains that a large percentage of the air munitions stockpile was either not compatible with or not optimal for the new jet aircraft that had entered the inventory.
- (6) A third factor of significance in measuring the adequacy of the January 1965 assets is in the validity of the source documents and methodology for computing requirements. Although an attempt had been made to update computational methods, the expenditure rates and mixes of munitions in use did not, in many cases, reflect the future requirements. Chapter IV details the evolution of requirements determination during the period of the Vietnam conflict.
- (7) A final complication was that neither the ammunition reporting systems nor the inventory data on which they were based were geared for wartime management requirements. Although asset figures indicating the existence of bomb bodies were relatively accurate, the availability of supporting fins, fuzes, and other components necessary for making up corresponding complete rounds did not have the same visibility in the eyes of key planners in considering the adequacy of pre-buildup resources.
- (8) Each Service was affected differently by the above considerations.

b. Army Readiness Posture

(1) On 1 January 1965 the Army readiness posture regarding munitions assets was critically inadequate. On a cost basis, the Army Mobilization Day Materiel Requirements computed in accordance with the then existing Logistics Guidance and including training losses, as funded through FY 67, totaled \$6.7 billion. As of 1 January 1965 the value of on-hand assets approximated \$5.2 billion. However, of this \$5.2 billion, the on-hand munitions stocks applicable to the requirement totaled \$3.3 billion, leaving a deficit of \$2.8 billion. Of the \$3.3 billion on hand, \$.2 billion was unserviceable, requiring renovation at a cost of \$99 million. Examples of shortages and excesses are depicted in Table 1.

(2) Focusing on the Pacific theater, the pre-positioned war reserves in support of USARPAC contingency plans totaled 89,000 short tons of applicable stocks on hand against a requirement of 121,000 tons. In addition to the 89,000 tons of pre-positioned war reserves on hand, there were 17,000 short tons of nonapplicable stocks located in the theater retained in an ownership account entitled Department of Army Forward Depot. These assets, essentially excesses accrued from the Korean conflict, were retained in-theater rather than retrograded to CONUS on the cessation of that conflict. In addition to those assets on the ground stored in depots, there were 200 short tons of munitions afloat in the Department of Army Forward Floating Depot (DAFFD). This floating depot, comprised of three ships at the time, essentially contained equipment and supplies to support a quick reaction brigade. The munitions aboard the DAFFD consisted of those items peculiar to a Brigade Table of Organization and Equipment (TOE). The DAFFD was disestablished in April 1966 to make the ships and materiel contained therein available to support the buildup in SE Asia. The adequacy of these requirements, predicated largely on consumption experience gained from World War II and the Korean conflict, has proved to be

AMMUNITION

TABLE 1

PERCENTAGE OF INVENTORY OBJECTIVES ON HAND
FOR SELECTED AMMUNITION ITEMS AS OF 1 JANUARY 1965

<u>Item</u>	<u>Army</u>	<u>Navy and Marine Corps</u>	<u>Air Force</u>	<u>Worldwide</u>
1. Rocket Motor 2.75" MK 4/40	NR	103	258	175
2. Cart 4.2" HE W & W/O Fuze	94	197	NR	109
3. Cart 81mm HE W/Fuze & Illum	177	117	NR	158
4. Cart 60mm HE & Illum	399	NR	NR	399
5. Cart 105mm HE M1 & Illum M314	362	85	NR	278
6. Cart 20mm HEI M56 W/M14 Link	NR	NR	44	44
7. Cart 40mm HE M406	48	93	NR	51
8. Bomb GP 250 LB MK 81	NR	26	NR	26
Bomb GP 250 LB AN-M57	NR	++	452	3777
Bomb FRAG 220/260 LB AN-M81/88	NR	++	2755	10345
9. Bomb GP 500 LB MK 82	NR	23	1	24
Bomb GP 500 LB AN-M64	NR	++	3424	5187
10. Bomb GP 750 LB M117	NR	NR	689	689
Bomb GP 1000 LB AN-M65	NR	++	++	++
11. Flare, Aircraft MK 24	15	35	32	28
12. Proj 5"/33 CAL AAC/HC/HE	NR	140	NR	140
13. Cart 5"/38 CAL FL/NFL	NR	135	NR	135
14. Proj 5"/54 CAL AAC/HC/HE	NR	88	NR	83
15. Cart 5"/54 CAL FL/NFL/UNIV	NR	100	NR	100
16. Proj 8"/55 CAL HC	NR	318	NR	318
17. Cart 8"/55 CAL FL/NFL/UNIV	NR	308	NR	308
18. Glide Bomb, NK 1 MOD 0 (WALLEYE)	NR	0	0	0
19. AGM-45 (SHRIKE)	NR	16	0	4
20. Disp & Bomb, CBU-24/29/49	NR	NR	0	0
Disp & Bomb, CBU-2	NR	++	102	107
Disp & Bomb, CBU-14	NR	NR	0	0
21. Rocket 66mm HE (LAW)	41	NR	NR	41
22. Cart 5.56mm BALL M193	112	NR	65	81
23. Proj 175mm HE M437	42	NR	NR	42

NR - No requirement; no assets.

++ - No requirement; assets retained on hand as substitutes for prime item shortages.

Source: Appendix D of this monograph.

AMMUNITION

questionable considering the consumption of munitions experienced in the Vietnam conflict. However, at that time it was not envisioned that consumption of munitions in Vietnam would reach record levels.

(3) From the standpoint of personnel the Army had adequate ammunition support units on an active duty status to support the active Army in a peacetime role, including the support of the U.S. Strike Command. However, in keeping with the planning at the time, it was envisioned that any large-scale deployment of combat units would be supported by mobilization of reserve forces. Since the number of logistic support units required in time of war greatly exceeds the number required in peacetime and since the Army logistics units were largely reserve units, mobilization would provide for the selective activation of the necessary ammunition support units to support the deployment of combat units. Dependence on the availability of these reserve units was inherent in all contingency plans; just as these same plans depended on mobilization to provide for the availability of private enterprise to augment the in-house munitions production base.

(4) As indicated in the review of the Army's logistic system, the data content and the frequency of the Ordnance 26 report militated against its use as a management tool in the Pacific theater, even though it served a useful purpose to the National Inventory Control Point. For management purposes within the theater, a monthly report was utilized. As a result of the buildup in Vietnam, the inadequacies of these reporting systems were almost immediately evident, and early action was taken to develop a responsive reporting system that would serve as a management tool at all levels of command.

(5) The munitions production base, consisting of 8 active and 16 inactive plants (the latter in various states of readiness), was producing at a rate of approximately \$48 million a month, or approximately 7 percent of the maximum rate required to match the envisioned consumption rate of basic Army forces. Acceleration to maximum capacity of the active facilities would have required 6 months whereas maximum production of the inactive facilities, depending on the state of readiness, would require 11 to 14 months. On the other hand, activation of the planned mobilization producers would not result in maximum production in less than 18 months. The reaction time of the production base, the inadequacy of the asset position on 1 January 1965, and the unforeseen consumption rates to be experienced in Vietnam caused a munitions shortage that could not be averted.

c. Navy Readiness Posture

(1) The basic Navy system of supporting deployed forces through a combination of strategically located overseas bases and Underway Replenishment Forces was well-adapted to the Vietnam era. The Seventh Fleet had been operating in WESTPAC under this system since the close of World War II and had gained considerable expertise and experience in its use. Backing up these deployed forces and bases was a strong central logistic agent, COMSERVPAC, and a well-developed CONUS shore establishment. Consequently, the Navy's ammunition logistic system in January 1965 was well-conceived for subsequent events, although weaknesses did exist.

(2) When the actual tonnage of ammunition available on 1 January 1965 is compared to the existent inventory objective, the Navy appears to have been in a favorable position. (Table 1 provides pertinent statistics.) Although it might have been questionable as to whether the 90-day war reserve allowance was sufficient to permit relief from production, it should be remembered that the guidance on which the allowance was based envisioned no more than two-thirds of the Pacific Fleet being engaged at one time. The additional ammunition associated with the non-engaged one-third, together with initial shipfills, was presumed to permit a minimum of 6 months of combat at the expenditure rates envisioned. Furthermore, considerable confidence was placed in the expenditures prescribed in the newly compiled NNOS on which these reserves were based. In this study the increased reliance on jet aircraft and the capability for heavier aircraft loads on A-4 attack aircraft as a result of improved bomb rack design was foreseen. Both of these trends meant not only that larger numbers of bombs would be required in the future, but also

AMMUNITION

that these would have to be low drag bombs.¹¹ Also, this study was based on the continuous employment of attack carriers at an average engagement rate of 50 percent for each carrier. Nevertheless, many of the January 1965 air munition assets were old, required renovation, and, because of their high drag characteristics, reduced the combat effectiveness of carrier jet aircraft. In fact, glaring shortages existed in low drag bombs (MK 81, 82, 83), in SHRIKE, and in the more advanced versions of SIDEWINDER (AIM-9C/Ds). In recognition of this fact, the Navy, immediately following the Gulf of Tonkin incident of August 1964, received authority to reprogram funds to procure an additional 66,000 MK 81 bombs and 41,000 MK 82 bombs.

(3) Confidence in the Navy NNOS with respect to the adequacy of gun ammunition reserves, however, was not as well placed. Although less emphasis had been given to antiair configured rounds at the expense of naval gunfire support rounds and the requirement for antijunk expenditures had been recognized, a change in computational methodology from rounds per barrel to analytic factors had resulted in a net decrease in total requirement from previous estimates. Consequently, the somewhat optimistic picture of the gun ammunition posture that prevailed in January 1965 was soon to undergo drastic change.

(4) The comparison of WESTPAC ammunition stockage requirements to assets on hand in short tons is shown in Table 2, together with total storage capacity.

TABLE 2
WESTPAC MUNITIONS STOCKAGE (TONS), JANUARY 1965

Parameter	Subic	Guam	Sasebo	Yokosuka	Total
On-Hand	16,500	15,600	25,800 ¹	6,000	74,000
Requirement	33,000 ²	25,000	39,500	25,600	125,600
Storage Capability ³	16,500	20,000	40,000	21,000	108,300

¹Includes Marine Class V on-hand.

²Includes wa'ved and open storage.

³Includes 3 AE loads (2,600 tons).

Source: CINCPACFLT, Briefing to JLRB, 9 September 1969.

(5) Although the WESTPAC stockage posture was adequate to support the limited expenditures of that period, it can be noted that only about 60 percent of PWRs requirements were actually in place. Further, storage requirements were approximately 17,000 tons greater than existing capacity with the shortage being most acute at Subic Bay. A request for additional facilities was made in January 1965.

(6) Of equal importance is a comparison of the port capabilities existing in WESTPAC in 1965 with those of 1969, as shown in Table 3.

(7) Subic Bay, which was to become the primary staging point for air munitions and Navy gun ammunition, required prompt and vigorous attention.

(8) Only a limited amount of ordnance was expended in SE Asia between August 1964 and 1 January 1965, and ammunition reporting systems in effect proved to be reasonably satisfactory for their purposes. As expenditures increased, however, these systems were unable to cope with or supply the data visibility demands resulting from an escalating combat situation. Requirements for timely reporting were to be recognized and improved systems instituted.

¹¹Navy Non-Nuclear Ordnance, Briefing to the JLRB, 26 September 1969.

AMMUNITION

TABLE 3

WESTPAC AMMUNITION THROUGHPUT CAPABILITIES, TONS PER MONTH (SUSTAINED)

<u>Facility</u>	<u>1965</u>	<u>1969</u>
NAVMAG, Subic	7,500	60,000
NOF, Sasebo	13,500	30,000
NOF, Yokosuka	1,500	1,500
NAVMAG, Guam	7,500	30,000

Source: CINCPACFLT, Briefing to JLRB, 9 September 1969.

(9) Although the Navy Government-owned base was in relatively good condition on 1 January 1965, the reverse was true regarding inert items producers. Here, the base consisted mostly of past producers who had been out of production for several years, with obsolete and deficient tooling, untrained manpower, and insufficient facilities to accelerate to mobilization rates. For instance, there was no production in process on auxiliary detonating fuzes or 3"/50 and 5"/38 projectiles and production of base fuzes and primers was all being done at Naval Ordnance Plant, Macon, with no commercial producer on the line. Limited production was going forward on 5"/54 projectiles, most caliber cartridge cases and on the MK 81 and MK 82 bombs, MK 24 flare and 5.0" ZUNI rocket, as examples. Monthly production on the SIDEWINDER AIM-9B had ceased and the AIM-9C and AIM-9D were just entering production. Although mobilization plans had been completed and contracts for their execution negotiated with producers, these producers were not prepared to get into operation quickly, and the schedules contained in these plans were unrealistically optimistic. Furthermore, military and civilian personnel who had experience and expertise in preparing data packages and performing industrial planning were no longer available.

d. Marine Corps Readiness Posture

(1) The Marine Corps ammunition posture on 1 January 1965 was at its highest peacetime level of readiness since the Korean War. Modern ammunition with adequate backup stocks was available to support units required for mobilization and to improve capability of the Fleet Marine Force.

(2) During the initial deployment of Marine Corps units to Vietnam, STORM requirements were positioned and earmarked at designated ammunition storage facilities in CONUS and SE Asia. Of the 120 days of ammunition allocated to the 3d Marine Expeditionary Force, 15 days were stored at Okinawa, 15 days at Subic, 30 days at Sasebo, and the first and second resupply of 30 days each were stored in CONUS at the Naval Ammunition Depots, Hawthorne, Nevada, and McAlester, Oklahoma. Project CLOUD mount-out requirements of 120 days for FMFLANT units were maintained at designated CONUS ammunition depots.

(3) Like the Navy and Air Force, the Marine Corps also had deficiencies in modern air munitions, but it was determined that these deficiencies could be met by less effective substitute items of air munitions.

(4) The Marine Corps ammunition logistic support organization, tailored to support amphibious operations of short durations, was not adequate, nor was it geared or conceived to provide responsive and effective ammunition support for a land campaign of several years duration such as Vietnam.

AMMUNITION

e. Air Force Readiness Posture

(1) Based on the war plans normally used to compute, acquire, and distribute ammunition during peacetime, the U.S. Air Force appeared to be, on 1 January 1965, in an acceptable wartime support posture. Logistics Guidance, published by the Office of the Secretary of Defense in consonance with existing war plans, tasked the Air Force to support 90 days of non-nuclear combat with modern air munitions and an additional 90 days using older ordnance. Even though the modern munition requirements were not scheduled to be completely filled until completion of the FY 68 buy, excesses of Korean War ordnance were of such magnitude that the gross tonnage on-hand was over three times the total stated requirement. The requirement, however, did not envision the magnitude that ammunition expenditure was to reach in Vietnam. In December 1968, for example, Air Force units expended almost 10 times the tonnage that had been stated as the monthly requirement in 1965. Turning from the quantitative to the qualitative aspects of asset position, a critical analysis of major munitions items required by PACAF reveals that stocks were primarily general-purpose bombs of Korean War vintage. The compatibility of new aircraft with obsolescent bombs had not been established. Many items were in short supply including low drag bombs, cluster munitions, air-to-ground missiles, mines, and flares. A breakout of selected assets and requirements as of 1 January 1965 is shown in Table 1.

(2) The readiness posture was also adversely affected by a lack of personnel skilled in nonnuclear munitions. A separate specialty for conventional ammunition officers did not exist, and few Aerospace Munitions Officers had other than nuclear weapon experience. Enlisted munition maintenance personnel were available only in numbers suitable for peacetime operations, not sustained wartime munitions storage area operations. No significant training base existed, as depot operations in the CONUS were an Army responsibility, and no units were in the Reserve forces specifically organized for conventional ammunition logistic operations.

(3) The concept of providing ammunition support to the forward bases in Vietnam through the main logistic support base at Clark AB resulted in a pipeline time of 270 days. Although not of major significance during 1964, when monthly expenditures averaged only 500 tons per month, this extended pipeline caused an inflexibility for rapid buildup or large-scale sustained operations.

(4) In the area of management information systems, problems were evident even at the low level of combat experienced in late 1964. The S-18 Ammunition Reporting System was proving to be inadequate in providing timely inventory data or accurate in-transit stock status. Further, it did not contain provisions for furnishing operational commanders with capability information—the amount of ammunition he possessed that was capable of being expended. Laborious calculation was required to convert inventory quantities of separate components into quantities of complete-round available-for-use weapons.

(5) It can be concluded that Air Force munitions assets far exceeded stated requirements in early 1965; and, although shortages of modern munitions existed, the older types of aircraft, such as the A-1E and B-57, being used in Vietnam were quite capable of using the obsolescent munitions available in large supply. The Air Force capabilities were restrained, however, by limited quantities of munitions suitable for high performance jet aircraft, in adequate numbers of trained conventional munitions personnel, an extended pipeline, and the lack of a timely, accurate, and responsive asset reporting system.

5. SUMMARY

a. On 1 January 1965, each of the four Services had organizational structures and logistic support systems in-being that were well suited to their individual missions and concepts of operation. Orientation was, however, toward the existent peacetime environment, and the results of stringent budgetary limitations were evident in the ammunition support structure. This was particularly noticeable in the degraded condition of Army and Navy munitions production facilities.

AMMUNITION

b. The overall readiness posture of the Services at this time was a reflection of the policies and guidance contained in the Logistics Guidance of the Secretary of Defense. Although more emphasis was placed on conventional warfare capability than was evident in the "massive retaliation era" of the mid- and late-1950s, great reliance was placed on World War II and Korean War ammunition stocks. Notwithstanding the obsolescent nature of much of this materiel, its existence contributed to such decisions as deferring funding of Army D-to-P authorizations and stretching out the Navy and Air Force's air munitions modernization programs.

c. It has also been observed that requirements determination techniques in use by the Services in January 1965 were not precise with respect to the type of conflict that was to develop in Vietnam. Information systems for ammunition reporting and asset computation then in existence were adequate for peacetime operations, but lacked the capability to respond to the dynamic needs of war.

CHAPTER III
AMMUNITION SUPPORT
DURING THE VIETNAM CONFLICT

CHAPTER III

AMMUNITION SUPPORT DURING THE VIETNAM CONFLICT

1. INTRODUCTION. This chapter provides an overall review of ammunition logistic support during the Vietnam era. While major emphasis is placed on actions taken in meeting the requirements of the operating forces engaged in Southeast Asia, the impact of supporting these operations on other theaters and areas is also addressed. As the majority of logistic lessons and judgments must be made in the context of the predeployment environment discussed in Chapter II, and of the problems encountered as logistic systems become geared to the demands of a rapidly escalating conflict, initial treatment is given to the events and actions of 1965 and early 1966, termed the buildup phase. Subsequent addressal is given to those situations, primarily in 1966, wherein shortages in air, ground and naval gunfire support ammunition reached critical proportions, the actions taken as a result thereof, and significant changes in posture engendered by the fluctuating requirements of the Tet and Spring Offensives of early 1968 and the ensuing de-escalation of combat tempo. Succeeding chapters will cover in greater depth such factors as ammunition program generation, production and distribution which contribute so vitally to the total problem of ammunition support. An analysis of principal ammunition line items is given in Appendix D.

2. THE BUILDUP PERIOD

a. Background. Although forces employed and the operations in which they were engaged on 1 January 1965 were relatively small, this situation was to change in the ensuing months to put ammunition logistic support systems to a severe test. In January 1965 authority had been given to conduct air strikes to support Vietnamese troops under emergency conditions and also to strike targets in remote areas which could not otherwise be attacked effectively. ROLLING THUNDER operations, involving both land and carrier based aircraft attacks against enemy lines of communications, commenced on 2 March 1965 to be followed by initiation of Attack Aircraft Carrier (CVA) sorties in support of in-country operations on 1 May and the entrance of the B-52s into the conflict on 18 June. On 14 May 1965, the use of naval gunfire in support of friendly forces in Vietnam commenced with the number and frequency of missions increasing thereafter. The Marines had landed at Da Nang in March and Chu Lai in May where an expeditionary field was built for the First Marine Air Wing. Thereafter there was a step by step buildup of U.S. Army and Marine ground forces and the deployment of air and naval forces to Vietnam, Thailand, and nearby waters. Expenditures of ammunition grew to unanticipated levels.

b. Army

(1) During the first few months of 1965, the Army ammunition logistic system in the Pacific described in Chapter II remained essentially unchanged, with a "pull" requisitioning procedure in effect. The theater Inventory Control Point (ICP) at Headquarters, U.S. Army, Pacific (USARPAC), performed central management of all inventories throughout the command. Requisitioning procedures flowed from U.S. Army, Vietnam (USARV), to the 2d Logistical Command on Okinawa, who filled them from available stocks or passed them directly to the National Inventory Control Point at the Army Ammunition Procurement and Supply Agency (APSA).

(2) Meanwhile, Army of the Republic of Vietnam (ARVN) forces continued to be supported under the Military Assistance Program (MAP). Ammunition requirements were developed based on a stock status report submitted by ARVN through Commander, U.S. Military Assistance Command, Vietnam (COMUSMACV), and Commander in Chief, U.S. Army, Pacific (CINCUSARPAC), which forecast these requirements for a period of 4 months. These forecasts were utilized as a basis for requisition and shipment actions. During this period, a separate service-funded pipeline was being used to support the Vietnamese Army.

AMMUNITION

(3) The period July 1965 to January 1966 is best termed as the "push" phase and coincided with the commitment in Vietnam of major combat units. Policy was that these units, when deployed, would be supported with 180 days of ammunition based on current Supply Bulletin rates pushed into the country in balanced quantities. The program was controlled by the Army Ammunition Procurement and Supply Agency with the nearest supply control exercised by the 2d Logistical Command. The ammunition pipeline was expanded to keep pace with the influx of tactical units and was designated to provide 60 days of ammunition in-country plus a 30-day reserve located offshore, primarily in Okinawa.¹

(4) Initial planning for ammunition support of USARV forces was based on Pacific Command (PACOM) Theater Combat Rates established in Supply Bulletin 38-26 (SB38-26), pending development of specific theater experience.

(5) As ammunition stocks built up, the Army experienced in-country distribution problems partially because of the limited availability of adequate storage facilities (see Chapter VI) but primarily as a result of dispersion of forces. In March 1965, there was one ammunition supply point in Vietnam which had 4,000 tons on hand. By the end of the year there were eight such supply points with 63,000 tons on hand, not including stockage in transit or quantities due from continental United States (CONUS). Owing to the lack of a controlled road network, little flexibility existed for shifting resources rapidly from one locality to another. Further, because intra-theater airlift was inadequate to do the job, backlogs created intense competition for priorities among the various Army field units in SE Asia.²

(6) Lack of storage areas and ammunition supply points for U.S. Forces in Vietnam and steadily increasing requirements had underscored the necessity for a central coordination office within the Military Assistance Command, Vietnam (MACV). Consequently, COMUSMACV established the MACV Ammunition Office on 15 June 1965 to serve as a single point of contact on all matters relating to ammunition requirements, storage and distribution. In practice, USARV, which was established in mid-summer 1965, managed in-country ammunition.

(7) A further problem experienced was that the rapid buildup of combat forces preceded ammunition logistic support companies and stock control personnel. Consequently, there were insufficient personnel of the requisite grade, knowledge and skill at the staff and operating levels to accomplish supply management transactions and storage site selection and planning. This situation was checked in early 1966 through the establishment of a separate staff section at Headquarters, 1st Logistical Command. (See Chapter VI.)

(8) The key to any supply system is requirements determination. This is particularly critical with respect to ammunition because of production lead times and the tonnage to be moved. Throughout this "push" phase, an ammunition stockage objective had not been established. The ammunition arriving in-country in amounts and types based on former war experience was not in all cases well tailored for the special requirements of the Vietnam conflict. Excesses began to build up in some types of ammunition while others remained in critically short supply. Among the latter were the 40mm HE (M384), 40mm HE (M406), 2.75" HE rocket, 81mm mortar illuminating and 105mm howitzer illuminating rounds. Attempts were made to fill these shortages through "pull" requisitioning but without complete success as items were critical worldwide. USARPAC, working through Commander in Chief, Pacific (CINCPAC), attempted, with some success, to alleviate this situation by shifting excess MAP ammunition from Taiwan to Vietnam and through use of airlift direct from production lines. USARV also controlled expenditures by the application of Available Supply Rate (ASR) constraints.

(9) The situation was placed in perspective by the Army Chief of Staff in his testimony of 26 January 1966 before the Senate Preparedness Investigating Subcommittee, which was looking into the so-called shortages of Army ammunition. He presented the following description of then existent ammunition rates of supply with respect to illuminants:

¹COMUSMACV, *History of U.S. Army Operations in Southeast Asia*, 1 January-31 December 1965, p. 112.

²Ibid.

AMMUNITION

<u>Parameters</u>	<u>Supply Bulletin Rate</u>	<u>Required Supply Rate</u>	<u>Available Supply Rate (31 Dec 1965)</u>
81mm Illuminants	.948	3.16	1.5
4.2" Illuminants	.861	4.30	1.0
105mm Illuminants	.640	9.60	1.1
155mm Illuminants	1.4	1.4	1.4
MK 24 Flare	7.2	10.0	10.0

(Rates are in rounds per weapon per day except MK 24, which is in thousands per month.)

(10) The Supply Bulletin Rate represented the quantity of ammunition required to supply fully approved forces, based on combat experience prior to Vietnam.

(11) The Required Supply Rate was the amount of ammunition estimated by CGUSARV to be required to sustain operations over an extended time frame.

(12) The Available Supply Rate was the amount of ammunition estimated by USARV and confirmed by COMUSMACV to be available for his use for a specific time frame.

(13) When one observes the inadequacy of the Supply Bulletin Rates for most illuminants when compared with actual Vietnam experience reflected in Required Supply rates, it is readily apparent why a "push" system based on these Supply Bulletin Rates resulted in in-country shortages. Similarly, the then-existent Supply Bulletin Rates did not reflect the high consumption needs of 40mm M384 cartridges and 2.75" rockets associated with the large-scale use of armed helicopters, as this was essentially a new weapon employment concept.

(14) The "push" period was short-lived. The first stockage objectives for USARV units were established for the Ammunition Month of March 1966 and were based on in-country weapons densities and updated Supply Bulletin rates. The new objective amounted to 86,000 tons. Also at this time, the 1st Logistical Command in Vietnam supplanted 2d Logistical Command in Okinawa as the primary contact point for Army ammunition in SE Asia.

(15) The determinations of projected ammunition consumption in Vietnam continued to be the hub of the Army's problem. In June 1965, the Secretary of Defense had indicated his desire to provide the Services with their valid requirements and to act promptly to increase procurement of munitions when justified.³ To ensure the availability of sufficient ammunition, the Secretary of Defense had increased the Army's original calculation of projected consumption, based on Pacific Theater Supply Bulletin Rates, by 50 percent in formulating the FY 66 supplemental budget. He had further charged the Secretary of the Army with modifying this budget up or down based on experienced consumption data furnished from Vietnam. Owing to the lack of valid and timely reports on which to base a response, the Army undertook a crash development of its World-wide Ammunition Reporting System (1322 System). (See Chapter IV.)⁴

(16) An associated problem to that of accurate rates and reporting systems was the resolution of weapons density and the lack of common acceptance of weapons density data by all elements of command. The rapid buildup of units and weapons in-theater, coupled with the directed attempts to increase the weapons available to the ARVN forces, led to considerable

³ASD(I&I), Memorandum to the Service Secretaries, subject: Munitions in Southeast Asia, 26 June 1965.

⁴Memorandum for the Secretary of the Army, subject: Report of DA Team Visit to U.S. Army Vietnam Concerning Ammunition, 29 October 1965.

AMMUNITION

confusion in the use of rates that depended on weapons density information to ensure accurate requirements forecasting.⁵

(17) In a further attempt to come to grips with the issue, the Army Assistant Deputy Chief of Staff for Logistics (Programs) made a visit to USARV Headquarters on 25 April 1966. He stated:

"Our problem is to decide what quantities of ammunition we have to buy in the rest of the FY 66, FY 67, and FY 68 budgets. With about a twelve-month lead time on a lot of ammunition items, this means that we must decide what production we want until 30 June 1968 as a minimum, and really we have to look beyond that point because our budget this year—this October when we submit it—will probably cover a period out that far. Now, we recognize your problem. We think your experience doesn't tell you enough to project a rate for any long period of time, but somebody has to do it. The most believable rate anywhere is that proposed by the commander here who is fighting a war and looking forward—looking at his plans, looking at what he is up against in the next year or two. It is an impossible task, but it has to be done and now."⁶

As a result of this visit, many reasons were forthcoming for increasing expenditure forecasts:

(a) Expansion of secure base areas releasing a greater percentage of the available forces for combat operations at higher rates of intensity.

(b) Opening of Lines of Communication (LOCs) permitting deployment of medium and heavy artillery to support operations in remote areas. Prior to this time, forces engaged in Search and Destroy operations had not had access to the existing road net and consequently heavy weapons from 4.2" mortars on up had not been employed in normal quantities as they and their ammunition had to be airlifted into position. In lieu of artillery support, there had been a heavy demand for air munitions (2.75" rockets and 40mm M384 grenades).

(c) The advent of the CH-47 CHINOOK in quantity affording the field commander a high degree of flexibility in the use of artillery and mortars.

(d) Use of barrage fires to discourage enemy assaults.

(e) Use of artillery for reconnaissance by fire wherein units advancing into areas susceptible to ambush tactics call for artillery to precede their advance.

(f) Communist tactical doctrine which placed emphasis on night combat and greatly increased requirements for illuminants.

(g) The high rate of fire of the M16 rifle when used in "Automatic."⁷

(18) A review of munitions combat rates based on these new forecasts indicated that increases over the existent Supply Bulletin Rate were required on approximately 20 major ammunition items. At the same time the termination date of major hostilities was revised upward from 30 June 1967 to be on or about 30 June 1968. The results of this review were reflected by the issuance of USARPAC Regulation 710-15 on 9 June 1966 specifying "Theater Required Supply Rates for Ammunitions SEA." This document was initially an internal CINCUSARPAC authorization which reflected USARV required supply rates. It was, however, utilized by all elements of the Department of the Army in programming, procurement planning, and distribution and was

⁵DCSLOG, Memorandum, subject: Ammunition Logistics in Support of SE Asia Operations, 1965-1968, 5 September 1969.

⁶Gen. F. J. Chesarak, Memorandum for Record, subject: Notes Recorded During Visit to Vietnam 23-30 April 1966, 20 May 1966.

⁷Maj. Gen. F. J. Chesarak, Memorandum for Secretary of Army, subject: Utilization of Ammunition in Vietnam, 23 June 1966.

AMMUNITION

used as a basis for requisitioning action by USARV. These new quantities were called the Theater Required Supply Rates (TRSRS). This change in combat rates created a major change in the Army's ammunition posture, resulting in a projection of significant drawdowns of available inventories of certain critical items which could not be replenished in the near future from programmed procurement. Their acceptance and implementation throughout the Department of the Army prior to adequate lead time for a corresponding buildup in production led to severe shortages in some items and the establishment of controls which are discussed later in this chapter.⁸

c. Navy Air Munitions

(1) Initial requirements for ROLLING THUNDER and in-country support by naval aircraft were supported by pre-positioned stocks of ammunition in the Eastern Pacific. With the commencement of intensified strikes in Vietnam in February 1965, many actions to improve the Navy's nonnuclear ordnance asset position were initiated. Among them were:

(a) Negotiation for procurement of 20,000 MK 81 bombs to avoid a three-month break between the end of production for the Air Force and the beginning of Navy production and acceleration of remaining MK 81 deliveries from FY 65 contracts.

(b) Implementation of priority action to renovate unserviceable but repairable ammunition.

(c) Commencement of banding certain high drag bombs to permit multiple carriage.⁹

(2) Initial resupply to restore Pre-positioned War Reserve Stocks was directed in March 1965. During this period, resupply time from the continental United States (CONUS) from initiation of a requisition to delivery in SE Asia was approximately 120 days. By June of 1965, consumption had continued to increase with the result that Commander, Service Force, U.S. Pacific Fleet (COMSERVPAC), had commenced a heavy "pull" resupply from available CONUS stocks. Pre-positioned War Reserve Stocks available in TYPHOON (Chief of Naval Operations (CNO) established Pacific Fleet Reserve), were limited to a 90-day reserve predicated on Non-Nuclear Ordnance Study (NNOS) rates, and only a portion of these were initially in the Western Pacific (WESTPAC) area.

(3) Loading-out ports in CONUS were also experiencing growing pains by March 1965 which contributed to the extended delivery time to the operating forces. Capabilities of the existing labor force and available equipment were vastly overtaxed. There were numerous breakdowns concerned with transportation facilities and inadequate material handling equipment (MHE). Most workers were relatively untrained and injury rates skyrocketed.

(4) Corrective actions were taken but the situation at the Naval Weapons Station, Concord, remained critical as it took care of outloading of Air Force as well as Navy ammunition. (See Chapter VI.)

(5) Several program actions were taken in rapid succession to alleviate shortages problems, although like the Army, problems existed in accurate forecast of expenditure rates. As a result of the expenditure experience in early 1965, a supplemental budget had been submitted on 10 May 1965 based on Department of Defense guidance. This provided, in part, for additional procurement of aircraft rockets, firebombs, and 20mm aircraft ammunition. The forecast was made that there would be an ample reserve of modern and low drag ordnance on hand in the Navy Worldwide Inventory on 30 June 1966 despite anticipated expenditures.¹⁰ On 9 July 1965, the apportionment request for FY 66 funds was based on 8 weeks actual combat expenditures

⁸Deputy Chief of Staff for Logistics, Memorandum, subject: Ammunition Logistics in Support of SE Asia Operations, 1965-1968, 5 September 1969.

⁹CNO, Memorandum Serial 914P41, Section 1A5, subject: Ammunition Logistics During the Vietnamese War 1965-1969, 5 August 1969.

¹⁰SECNAV, Memorandum Serial 00155, 10 May 1965.

AMMUNITION

ending 15 May projected for engaged forces and known Marine squadrons for which deployment squadrons had been approved and included replacement of nonmodern and obsolescent ordnance by low-drag bombs.¹¹ The FY 66 supplemental request encompassed reorder lead times. It was constrained to specified sortie rates and aircraft loading factors, and highlighted the need for further expansion of production facilities, the earliest delivery from which was estimated as July 1966.¹² In addressing the FY 67 budget in the fall of 1965, the Secretary of Defense, by Subject Issue No. 757, approved additional sorties but correspondingly reduced tons per sortie by about 15 percent from NNOS rates. These actions would prove insufficient to meet the needs of the escalating war, as it may be seen from Figure C-1 that both sorties per month and tons per sortie, the planning factors on which air procurement programs were based, would rise significantly in 1966.

(6) By August 1965, the high level of expenditures had largely depleted WESTPAC reserves and useable air munitions arriving in complete rounds from CONUS were consumed as rapidly as they were received. Full use was being made of available substitute ordnance ("fat" bombs). Drawdown had begun on some Atlantic Fleet stocks in CONUS and all renovations and new loadings were being shipped to the Pacific Fleet.

(7) A study by COMSERVPAC in August 1965, which analyzed and forecast the adequacy of ammunition from a logistic point of view, concluded that the number of weapons in short supply in the Pacific, old and new, was more critical than previously realized and the get-well dates would be much later than previously predicted.¹³ As then predicted, the low points for air weapons would be reached in the spring and summer of 1966.

(8) It became increasingly important to reduce the time lag of shipments of critical air munitions to a minimum. A "push" shipment was started in August 1965 whereby critical ordnance would be automatically shipped directly from production lines to SE Asia. These were selectively placed on a "pull" basis when the situation improved. Palletizing of all ammunition was required. As a result of delays encountered in acquiring Military Sea Transportation Service (MSTS) ships promptly, a Movements Control Unit was established at the outloading point, the Naval Weapons Station, Concord, California, with responsibilities to COMSERVPAC. At the latter's request that a single office be established to monitor, expedite and report critical ammunition from the time it left the production line until shipment from the CONUS, an office was set up at Mechanicsburg, Pennsylvania. As a result of steps such as these, the pipeline time to SE Asia was cut to 70 days and finally to an average of 58 days.

(9) Air shipments of MK 2 impulse cartridges for ejecting stores from bomb racks began in September 1965 and would continue many months. Other air shipments would be required from time to time for scarce components and air weapons, particularly firebombs and MK 24 flares, with shifts back to surface shipments when assets permitted.

(10) There were complicating logistic support factors, essentially unique to air munitions. Although the NNOS had predicted the total daily expenditure of air munitions with reasonable accuracy, the high percentage of obsolescent weapons in the existent air munitions inventory led to problems in weapon and weapon system compatibility and unserviceability with respect to available stocks. Substitutions in strike loadouts became the order of the day. Owing to the unique characteristics of aircraft carrier operations, unbanded high-drag bombs entailed disadvantages, particularly with respect to forces flying missions against targets in North Vietnam. These included a 60 percent reduction of bomb carrying capacity, catapult restrictions, increased loading time and degraded aircraft performance.¹⁴ To augment the shortage in MK 81/82 bombs, "fat" bombs were banded to permit multiple carriage on modern multiple ejector

¹¹ASN(FM), Memorandum Serial 00299, 9 July 1965.

¹²SECNAV, Memorandum Serial 00232, 19 July 1965.

¹³COMSERVPAC, Operations of Service Force, Pacific, FY 1966, Chap. 10.

¹⁴CINCPACFLT, Message 040725Z, May 1966.

AMMUNITION

bomb racks (MERs) at the Naval Magazine, Subic. (See Appendix A.) Shortage of banding kits and installation tools necessitated supplying equipment by two airlifts per week.¹⁵

(11) The problems of a marginal asset position were further compounded by the scarcity of individual components, such as fuzes and fins, required to make a usable or complete round. Ammunition logistic management throughout the fleet had been effected on a component basis to provide for maximum latitude in weaponeering against various types of targets. A high degree of component interchangeability existed within the various weapon types. Bomb fins, fuzes and arming wires are typical examples. Thus the shortage of a single interchangeable component could impair the availability of several different weapons.¹⁶ In August, COMSERVPAC requested that certain air ordnance items be shipped as complete rounds. Although the Complete Round Ammunition Shipment (CRAMSHIP) procedures were not in use until March 1966, partial implementation started in the fall of 1965. This system was extended to other air munition items and ship gun ordnance in May 1966.

(12) Improvements were also needed in the fleet ammunition reporting and information system as, up to this time, there was a tendency for various commands and offices in Washington to perform their own calculations based on uncorrelated expenditure information direct from operating units. (See Chapter IV.) A particularly difficult area was that of keeping track of ammunition enroute. A new system of reporting shipping information was developed by COMSERVPAC in September 1965. As a result, the underway progress of ships transiting the Pacific was monitored on a daily basis by an automatic data processing (ADP) system, and all ammunition was followed until its receipt at the final destination.¹⁷

(13) Limitations in throughput and storage capabilities became critical in the summer of 1965 at the Naval Magazine, Subic, which became the major storage and transshipment point for underway replenishment ammunition for the Seventh Fleet, for shipments to the Marine air wing at Chu Lai, and for other requirements in support of the Vietnam conflict. Emergency action was taken in August to increase the throughput capabilities and provide temporary hardstands for storage. Military construction programs took many months to provide a permanent pier, handling areas and magazines. Meanwhile the explosive inventory grew from 20,000 tons to a dangerous 77,000 tons in January 1966. Items of lower demand were transferred to other locations in the Western Pacific. The Naval Magazine at Subic performed increasing functions, including modification and renovation of ammunition, and later the test and rework of missiles.

d. Ship Gun Ammunition

(1) With the start of gunfire support in May 1965 and the increase in demands for such support, many problems were encountered in regard to ship gun ammunition.

(2) The August 1965 SERVPAC study showed 5"/38 and 5"/54 ammunition also to be in short supply. Meanwhile expenditures exceeded previous forecasts. In October it was necessary to alter 100,000 rounds of proximity-fuzed 5"/38 antiair projectiles by installing point detonating fuzes for shore bombardment use. Approximately 100,000 more rounds were altered in April 1966. Training was curtailed and magazines in ships in the Eastern Pacific were reduced to 50 percent of allowance of this type.¹⁸ Worldwide Navy assets of 5"/54 projectiles were sufficient to modify only 16,500 rounds from antiair to bombardment types. On occasion 5"/54 destroyers, longer ranged than 5"/38 ships, were pulled from the line because of shortages. Several types of ammunition were transferred from the severely limited stocks of the Atlantic Fleet.

¹⁵OPNAV, Memorandum Serial 914P41, sec. 1A5, subject: Ammunition Logistics During the Vietnam War, 1965-1969, 5 August 1969.

¹⁶OPNAV, Memorandum Serial 914P41, sec. V, subject: Ammunition Logistics During the Vietnam War, 1965-1969, 5 August 1969.

¹⁷COMSERVPAC, Operations of the Service Force, Pacific, FY 1966, pp. 10-14.

¹⁸COMSERVPAC, Operations of Service Force, Pacific, FY 1966, pp. 10-11.

AMMUNITION

e. Marine Corps

(1) In spite of the fact that the basic concept and doctrine for Marine Corps operations did not include the continuous commitment of major elements to a sustained land campaign, as was to prove to be the case in Vietnam, the problems encountered in ground ammunition logistics during the buildup phase, though considerable, did not reach critical proportions. Shortages in desired types of air munitions did exist, were similar to those experienced by the Navy, and, with the exception of in-country storage problems, came under the same corrective command and management action as in the case of the Navy. In the case of ground munitions, the availability of war reserves and Korean War excesses, together with the shifting of in-country resources by COMUSMACV on a loan and pay back later basis, essentially prevented acute shortage situations from arising. As in the case of the Army, illuminating rounds were in short supply.

(2) With the commencement of Marine deployments to Vietnam, units withdrew 60 days of combat ammunition which had been pre-positioned in Okinawa; Naval Ordnance Facility (NOF), Sasebo; Naval Magazine (NAVMAG), Guam; and Naval Ammunition Depot (NAD), Oahu. In addition, the Commanding General, Fleet Marine Forces, Pacific (CGFMFPAC), withdrew the 30-day first resupply ammunition block from NAD, Hawthorne, less items not needed in Vietnam such as 120mm tank ammunition. As additional combat units deployed from CONUS to Vietnam, or to other WESTPAC locations, each unit departed with a 30-day mount-out package from CONUS depots. Any remaining STORM (FMFPAC) mount-out and reserve assets reverted to Commandant, Marine Corps (CMC), control as non-earmarked assets and were utilized for replenishing the Vietnam pipeline pending receipts from new production.¹⁹

(3) A concept to support III Marine Amphibious Force (III MAF) units in I CTZ with ground munitions (Class V(W)), was developed and promulgated by the CMC on 16 August 1965 by which:

(a) Headquarters, Marine Corps (HQMC), established expenditure rates, effected procurement, provided shipping directives and monitored expenditure reports. The HQMC also maintained up to 60 Days of Ammunition (DOA) flow of Class V(W) in the pipeline to WESTPAC, as required.

(b) NOF, Sasebo, monitored activities within WESTPAC, received and processed Class V(W) requisitions and provided overall coordination for shipment of Class V(W) to other pipeline activities while storing 30 DOA of Class V(W) pipeline material. In this capacity NOF, Sasebo, unofficially assumed the role of WESTPAC Class V(W) offshore Inventory Control Point as forces and their support built up.

(c) Naval Magazine, Subic, maintained a stockage of selected pipeline material and shipped Class V(W) to III MAF.

(d) Third Force Service Regiment (3d FSR), Okinawa, shipped Class V(W) to III MAF and maintained a mount-out for units of the Ninth Marine Amphibious Brigade plus a stockage objective of 3d FSR and NAVMAG, Subic, equating to 15 DOA, for a total offshore WESTPAC Stockage objective of 45 DOA.

(e) Force Logistic Support Group (FLSG), III MAF (later to become the Force Logistic Command (FLC)), provided the storage and distribution of Class V(W) material for III MAF units and maintained a stockage objective of 45 DOA pipeline material distributed between Ammunition Supply Points (ASPs) at Da Nang (30 DOA), forward ASPs (11-12 DOA), and with the using units (3-4 DOA).

¹⁹CMC, Memorandum C 911543, Ammunition Logistics in Support of SEA Operations, 1965-1968, p. 2, 1 August 1969 (CONFIDENTIAL).

AMMUNITION

(4) A subsequent revision to the concept was to limit those levels of Class V(W) held at 3d FSR to high usage items only, such as grenades, pyrotechnics and illumination projectiles, and to increase the level at NAVMAG Subic to a full 15 DOA.

(5) The pipeline concept of 16 August 1965 also established a requirement for a monthly report of asset and expenditure data from using units in order to permit effective control of ammunition.²⁰

(6) At the inception of the Vietnam conflict and throughout the buildup period, the resupply of ammunition was accomplished primarily on a "pull" basis. This system was based on requisitions being received by NOF, Sasebo, from FLC and the other two offshore support activities. If unable to fill them from WESTPAC resources, NOF, Sasebo, referred them to HQMC.

(7) Although this system proved highly effective, some problems were encountered. Principal among these were continuing deficiencies in storage space and facilities, difficulties in the acquisition of adequate real estate and the shortage of ammunition personnel. (See Chapter VI.)

(8) Imbalances in the Class V(W) pipeline also occurred periodically as a result of one or a combination of the following factors:

(a) Higher than normal expenditures as the tempo of operations increased.

(b) Suspensions of specific lot numbers.

(c) Deterioration of ammunition containers (and the ammunition contained therein) as a result of excessive exposure to the elements during field storage in the Vietnam climate. (See Chapter VI.)

(d) Shipping delays resulting from labor disputes, mechanical problems and bad weather.

(e) Loss of assets from Ammunition Supply Point (ASP) explosions. (See Chapter VI.)

(f) Inventory losses.

Owing to the overall efficiency of the Marine Corps Class V(W) pipeline, corrective actions required were minimal. However, if the severity of the pipeline so dictated, either a built up higher stockage objective was authorized by HQMC or the CG III MAF established an Available Supply Rate (ASR) for the items in short supply. In addition to effective management, the proximity of the offshore depots to Da Nang was one of the many reasons for the responsiveness of this pipeline.

f. Air Force

(1) Many of the problems faced by the Navy in the buildup phase were equally applicable to the Air Force, e.g., shortages of preferred assets, incomplete rounds, long delivery times, insufficient storage and throughput capability and lack of a wartime ammunition information and reporting system in effect. Added to the above was the requirement to conduct high intensity air operations from austere in-country forward operating bases supported by a main operating base at Clark Air Base in the Philippines.

(2) In early 1965, the Air Force nonnuclear munitions War Reserves program was authorized primarily to supplement its nuclear programs. Consequently there was insufficient

²⁰CG, FMFPAC, Letter, Serial 8011, subject: FMFPAC Class V Briefing, 5 September 1969.

AMMUNITION

inventory to support an effort such as Vietnam. In addition, the majority of these munitions were obsolescent and had not been certified for use in conjunction with modern jet aircraft.²¹

(3) Using tonnage as the sole criteria, Pacific Air Forces (PACAF) had on hand a 120-day supply of air munitions at the rates then estimated against a War Reserve requirement of a 90-day supply. This proved to be inadequate as the tonnage making up a day's supply doubled by 1966.

(4) Because of the relatively meager initial assets in useable air munitions, slow production buildup and escalating requirements, munitions stocks in CONUS rapidly dwindled. As a result, in late 1965 and early 1966, the drawdown of PACAF rear area War Reserve stocks began. In all, about 2 months' support at the 1965 rate was withdrawn. Bombs began to arrive in SE Asia minus essential components. During this period, a rate of 2.11 tons per sortie was maintained at great expense, including the airlifting of several hundred 750-lb bombs from rear bases and massive in-theater redistribution of critical components. As expenditures continued to increase during the first 3 months of 1966, to conserve some of the more critical bombs, substitute loading became necessary. For example, to conserve 750-lb bombs for hard targets in North Vietnam, greater reliance was placed on use of smaller bombs, rockets, and gun ammunition against targets in the south. Expenditures increased to the point where they exceeded input.²²

(5) The principal underlying cause for initial low asset position was the method by which the Air Force developed requirements. War Reserve requirements were computed by the Air Force Logistic Command utilizing standard programming documentation provided by Headquarters, U.S. Air Force. Representative documents were War Plans and basic program manuals. The resulting product did not fit the SE Asia experience. Unplanned extensive usage of the B-52s in the conventional role in support of SE Asia operations was an aggravating factor of major proportions. Three hundred B-52 sorties per month were authorized and being flown by August 1965. This number rose to 400 sorties per month by January 1966. (See Figure C-2.)

(6) With respect to SE Asia consumption, there was no formal determination of requirements which considered aircraft load factors, sortie generation rates, force bed-down or deployment. In the early time frame, PACAF SE Asia requirements were developed at Headquarters, 2d Air Division, and furnished to PACAF for publication in PACAF Letter 136-2 which became the basis for requisition and supply action.²³

(7) As a result of the increased expenditure experience subsequent to the commencement of ROLLING THUNDER, additional funding was provided through several emergency budget submissions. The FY 65 budget included \$165 million for USAF ordnance. Congressional approval of supplemental funds and several reprogramming actions increased the total for the year to \$291.5 million. The additional funds were for the purchase of dispenser ordnance, new 500-pound bombs and 20mm training ammunition. The basic FY 66 budget originally asked for \$284.7 million for air munitions, but the total approved requests for that year eventually amounted to \$1,220 billion, more than five times the budget as originally approved. The time lag between the availability of these funds and the ability of the production base to expand and deliver accordingly caused assets to remain in very limited supply during this phase. The Air Force adopted a policy of strict allocation of certain munitions to ease the situation pending expansion of production.

(8) A shortage of Air Force personnel trained in ammunition logistics added further difficulties. The Ammunition Control Point at Tan Son Nhut was formed in May 1965 with one warrant officer and five airmen, all of whom were from the supply career field and none of whom had any previous munitions experience. This initial group "wrote the book as they went along."

²¹Hq, USAF (AFSSS), Letter, subject: Munitions Logistics During the Vietnam Conflict, 1965-1968, 16 September 1969 (CONFIDENTIAL).

²²PACAF, Briefing to JLRB Ammunition Team, 6 August 1969.

²³Hq, USAF (AFSSS), Letter, subject: Munitions Logistics During the Vietnam Conflict, 1965-1969, 16 September 1969 (CONFIDENTIAL).

AMMUNITION

Only limited guidance was given in existing directives and no guidance envisioned the logistics support requirements of an operation that expanded as rapidly as the SE Asia buildup with its introduction of new and sophisticated aircraft and the multitude of munitions required.²⁴

(9) With the advent of ROLLING THUNDER, the distribution system through Subic Bay to Clark Air Base, followed by subsequent transshipment through Subic Bay to Tan Son Nhut and Bien Hoa via LST and barges, lacked timeliness and flexibility. Air lifting of munitions became necessary to maintain support. Travis AFB was utilized as an Aerial Port of Embarkation (APOE) for high priority shipment to SE Asia.²⁵ As more bases were opened the problems of offloading and in-country distribution became more severe. Ports became glutted with air munition loaded ships awaiting discharge. (See Chapter VI.)

(10) Complicating the above were the severe problems of incomplete rounds and weapon and weapon system compatibility. Urgently needed components were mal-distributed throughout the combat theater thereby causing an inordinate amount of effort to be expended in inventory management by an already overtaxed support cadre. As was true for the Navy, the Air Force found it necessary to devise and place in effect a system that would provide for the shipment of air munitions from CONUS by complete rounds.

(11) The Air Force did not band obsolescent World War II "fat" bombs as the Navy did to permit carriage on Multiple Ejector Racks (MERs). The older rack designs of the B-52, B-57, A-1, and, to a limited extent, the F-100, together with less severe structural requirements (no catapult launching) allowed usage without modification, albeit at some loss in aircraft performance. Notwithstanding, the problems of "fat" bomb compatibility with the modern jet aircraft in the Seventh Air Force were pronounced, owing to a lack of necessary weapon and weapon system certification. (See Appendix A.)

(12) One of the first areas to be attacked was that of devising a system for faster transportation of ammunition to SE Asia, which would also aid in relieving the critical shortage of in-country storage facilities. The resultant system, jointly collaborated on by Ogden Air Materiel Area (OOAMA), Air Force Logistic Command (AFLC), Headquarters, Pacific Air Forces (PACAF), and the Thirteenth Air Force, in March 1965 was labeled "Project SPECIAL EXPRESS."

(13) In spite of the need to withdraw ships from the limited supply of ocean-going shipping assets, SPECIAL EXPRESS adequately fulfilled its purpose during the early days of the conflict. Although it posed additional port problems, it permitted added flexibility, allowed selective discharge of complete rounds, eliminated some of the congestion at Subic, and reduced airlift requirements of components that were needed to make complete rounds. This last problem was far from being solved. In addition, SPECIAL EXPRESS provided time to obtain real estate and to construct the necessary port and storage facilities while, at the same time, reducing the double handling that had previously been necessary.²⁶ The SPECIAL EXPRESS system was replaced in early 1966 by the SPECIAL VESSEL System. (See Chapter VI.)

(14) To back up the new transportation systems, a new organization was established at OOAMA in January 1966 with a unique mission never before performed in the Air Force. The organization that was to later become the nucleus of the Air Munitions Transportation Control Center was designed to manage and monitor the movement of air munitions. Its functions were to effect liaison in the movement of air munitions from the producer to the user, to ensure complete round shipments, and to conduct a systematic recording of air munitions transportation transactions.²⁷

²⁴PACAF, Briefing to JLRB Ammunition Team, 6 August 1969.

²⁵Hq, USAF (AFSSS), Letter, subject: Munitions Logistics During the Vietnam Conflict, 1965-1969, 16 September 1969 (CONFIDENTIAL).

²⁶PACAF, Briefing to JLRB Ammunition Study Group, 6 August 1969.

²⁷Hq, USAF (AFSSS), Letter, subject: Munitions Logistics During the Vietnam Conflict, 1965-1968, 16 September 1969.

AMMUNITION

(15) Much effort was devoted to the improvement of reporting systems. In the very early days of the conflict, the Emergency Action Reporting for Logistic Action Programming (EARFLAP) System had been introduced as the primary SE Asia reporting vehicle. At the same time, assets shipped from Clark Air Base were dropped from the inventory and considered expended as far as the Standard Air Force World-Wide Reporting System (S-18) was concerned. As the conflict escalated so did the EARFLAP report, which expanded from a report consisting of some 10 or 15 items to some 400 items including all the component items needed to assemble complete rounds in any configuration.²⁸ From the point of view of the in-theater operator the entire air war effort was dependent upon the EARFLAP report even though it was produced under the worst possible conditions in the field. However, it did not serve all the needs of the Inventory Control Point at OOAMA, the Air Staff, nor the Joint Chiefs of Staff. As a result the S-18 system was introduced in SE Asia in January 1966 for the first and only test of that reporting system under combat conditions. Again from the point of view of the operator, this report was duplicative as it was necessary to report the same item on EARFLAP in addition to S-18. Further, data in the computer at OOAMA were inconsistent with comparable data reported in the EARFLAP reports and the problem of false intransit data was not rectified by the new system. As a result, the S-18 report was discontinued on 31 March 1966 in favor of the new Air Force Southeast Asia (AFSEA) report which attempted to bridge the gap between SE Asia and World-wide reporting requirements.²⁹ (See Chapter IV.)

(16) An additional change of sizeable import which took place during the buildup period was in the organizational structure of the in-theater Air Forces. Since 1962, the principal Air Force command element in Vietnam had been the 2d Air Division of the Thirteenth Air Force with headquarters at Tan Son Nhut. On 8 April 1966, the Seventh Air Force was reactivated and assumed command of bases and Air Force operations in South Vietnam. Bases in Thailand were placed under the Thirteenth Air Force. A notable exception to the normal command line was that, although the Thirteenth Air Force remained responsible for normal logistical support of Thailand Bases, the Seventh Air Force was given the operational control of the air war including the munitions associated therewith in both Vietnam and Thailand.

g. Summary. Many of the problems associated with effective ammunition support during the buildup phase were common to several of the Services. Foremost among these was the adequacy of desired assets for the engaged forces. Pre-positioned War Reserve stocks proved to be insufficient to fill the gap until production could match expenditures and it became necessary to draw down on CONUS reserves and other worldwide assets. The difficulty of accurately determining requirements in a rapidly escalating combat situation was an aggravating factor as were the combat constraints of obsolescent air munitions and the lack of complete rounds. Congestion at outloading ports coupled with lack of adequate support personnel and throughput and storage facilities in SE Asia hampered efforts to reduce in-transit time. Much effort was devoted to the expansion of SE Asia port and storage facilities and to the adoption of interim measures such as SPECIAL EXPRESS to fill the gap pending their availability. Extensive use of automatic "push" shipments and premium air transportation were required, both inter- and intra-theater. The inadequacy of peacetime reporting systems to provide rapid and accurate accounting of assets as well as their location enroute from CONUS necessitated prompt and aggressive steps toward their improvement. Although no drastic curtailment of planned operations resulted, there were many times when expenditures were asset limited.

3. CRISIS AND STABILITY

a. General. Ammunition support underwent its most critical phase in 1966, during which period actual or predicted shortages triggered intensive management actions and the imposition of additional controls. Subsequently, except for the surges associated with the Tet and Spring Offensives of 1968, ammunition support stabilized. As the events and actions related to air, ground and naval gunfire support munitions developed separately, they are discussed individually.

²⁸Ibid.

²⁹PACAF, Briefing to JLRB Ammunition Team, 6 August 1969.

AMMUNITION

b. Air Munitions

(1) The situation with respect to air munitions continued to deteriorate during the early months of 1966, reaching crisis proportions in April of that year.

(2) As early as June 1965, CINCPAC had informed the Joint Chiefs of Staff that interservice loans would only temporarily ease the air munitions situation and indicated that ammunition requirements would increase.³⁰ As the Unified Commander, he had authority to make diversions of this nature under wartime conditions and where critical situations made such actions necessary for the accomplishment of his missions.³¹ Later in February 1966, CINCPAC specified by type the SE Asia munitions requirements, including a review of existent assets and their distribution, and requested confirmation of bomb availability. Based on information available, the deficit amounted to 563,000 bombs.³²

(3) Partially as a result of this message, the Office of the Secretary of Defense made an analysis based on 31 March 1966 data of air ordnance assets covering 23 key items, including high explosive and fire bombs, rockets, flares and aircraft gun ammunition. Of the quantity in worldwide inventory, about 55 percent was accounted for by the Air Force and 45 percent by the Navy including the Marines. About 22 percent were on hand in SE Asia and 13 percent in-transit to the theater. Approximately one-third of the total tons in-theater were comprised of incomplete rounds. For example, on-hand asset data reflected some high explosive bombs without fin assemblies or fuzes; rockets were included as motors but without warheads; and fire bombs were reported without cable assemblies required for fuze arming. (See Table C-1.)³³ Monthly production covering 23 key items, was about 40 percent of the existent consumption rate.³⁴

(4) With limited assets complicated by the lack of components to match bomb bodies at certain bases, Air Force expenditures in April 1966 dropped appreciably, accompanied by dwindling Seventh Air Force sortie rates. (See Figure C-3.) Navy and Marine Corps sorties experienced a similar but less pronounced trend. (See Figure C-1.) The COMUSMACV informed CINCPAC and the Joint Chiefs of Staff on 8 April that he considered air munition shortages an emergency situation seriously affecting air strike capability in SE Asia. He cited the fact that during the first quarter of 1966, some 940 intra-theater airlift sorties had been used to distribute and redistribute munitions, that between 4-7 April some 233 strike sorties had been cancelled or not scheduled, and that aircraft were being held on ground vice air alert to conserve ammunition. Further, the effectiveness of the strike sorties actually executed was reduced by less than optimum loadings for the targets assigned.³⁵ During the period 11 April to 14 April, 515 in-country air strikes that otherwise would have been flown were not scheduled owing to ordnance shortages.³⁶

(5) The COMUSMACV's message set off a rapid chain of events both in the Pacific theater and in Washington. The CINCPAC recommended the establishment of employment limitations, as necessary, to ensure munitions availability until sufficient quantities become available plus the positioning in SE Asia of the maximum amounts of ammunition.³⁷ The Chairman of the Joint Chiefs of Staff advised that the SE Asia air munitions problem was being addressed in two phases. For the immediate phase, CINCPAC was authorized to divert and commit to operations in support of SE Asia, for the use of any of his component commanders, any appropriate air munitions resources in PACOM without regard to ownership. This authority was intended as a temporary measure and specifically applied to reserves held in Korea for support of U.S. forces. The Joint Chiefs of Staff had authorized CINCPAC to delegate this authority to

³⁰CINCPAC, Message 132200Z August 1965.

³¹JCS Pub 2, sec. 30203.

³²CINCPAC, Message 122305Z February 1966.

³³OSD (I&L), Summary Analysis of Air Ordnance Assets, as of 31 March 1966.

³⁴OSD (C), Air Munitions Production, Consumption and Inventory, Statistical Services Tables 201-203.

³⁵COMUSMACV, Message 050826Z April 1966.

³⁶COMUSMACV, Command History, 1966, p. 255.

³⁷CINCPAC, Message 090941Z April 1966.

AMMUNITION

COMUSMACV and Commander, U.S. Military Assistance Command, Thailand (COMUSAMAC-THAI). However, in most cases the diversions involved forces outside as well as within the areas of these subordinate commanders and such delegation was never implemented. CINCPAC was also directed to:

(a) Establish base operating stock levels to be maintained by his components and CINCPAC forces in PACOM.

(b) Establish consumption rates consistent with available ammunition.

(c) Adjust tasks and missions for his components and CINCPAC allocated B-52 (ARC LIGHT) forces accordingly.³⁸

(6) Following an Air Munitions Conference in Hawaii on 11 and 12 April 1966 the Secretary of Defense released significant Navy and Air Forces assets in CONUS and authorized transportation in premium rate ships, if available; otherwise, combatant ships or other fleet assets were to be requested from the Joint Chiefs of Staff.³⁹ Navy assets specifically identified were 37,000 tons of assorted air munitions in CONUS depots earmarked for Commander in Chief, Atlantic (CINCLANT), and included all Atlantic Fleet CONUS assets with the exception of training allocations, and 30-day mount-out reserve for Fleet Marine Forces, Atlantic.⁴⁰ CINCLANT's immediate evaluation of this action was that his capability to support CINCLANT Operations Plans was seriously degraded.⁴¹ (See Appendix E.)

(7) The CINCPAC immediately requested that complete rounds of all ammunition thus made available be shipped to the Western Pacific pending determination of specific destinations following an imminent allocations conference. The Joint Chiefs of Staff concurred and directed the Chief of Naval Operations and the Air Force Chief of Staff to comply. Within 2 weeks Navy assets were moving to the onloading port. After a delay the Air Force commenced movement of some CONUS assets to port but soon stopped pending further evaluation.⁴²

(8) Another factor of significance at the Honolulu Conference of 11-12 April was the considerable delay encountered in assembling valid production and asset data. For instance, the CONUS assets reported as available for CINCPAC allocation in mid-April were reduced downward by a factor of approximately 21 percent at the end of May.⁴³ At the request of the Secretary of Defense, CINCPAC submitted daily reports on critical air munitions based on submissions by the component commanders. The need for improved munitions reporting systems was recognized and was given strong impetus both in Washington and Honolulu. In July 1966, the ADP-oriented PACOM air munitions reporting system was operational. Initially, this report was produced every 10 days to provide commanders and managers with needed in-position and in-transit asset data as well as current consumption. The 10-day cycle was changed to a twice-monthly cycle in December 1966.

(9) Among the actions taken in response to the April crisis were: accelerated bomb production with emphasis on MK 82 (500 pound) bombs; more intense management of bomb components; and establishment of specified sortie plans by month, average plane load and Service. The CINCPAC set a SE Asia operating stock level of 45 days and specified monthly allocations to the component commanders for critical air munitions, updated as the situation changed.

(10) Starting on 19 April, CINCPAC ordered transfers of ammunition between Services, including assets for the armed forces of Vietnam and Thailand.⁴⁴ Some 58

³⁸JCS, Message 081946Z April 1966; JCS, Message 142345Z April 1966.

³⁹SECDEF, Message 151629Z April 1966.

⁴⁰SECDEF, Message 161609Z April 1966.

⁴¹CINCLANT, Message 200006Z April 1966.

⁴²CINCPAC, Command History 1966, p. 759.

⁴³CINCPAC, Letter, Serial 002367, subject: CINCPAC Munitions Briefing and Related Documents, 27 August 1969.

⁴⁴CONSERVPAC, Operations of Service Force, Fiscal Year 1966, pp. 9-10.

AMMUNITION

diversions/redistributions, known as CINCPAC Ammunition Transfer Orders (CATOs), were directed during the balance of 1966 with 166 issued by mid-July 1969.⁴⁵ Though the Services continued to control their own assets, CINCPAC monitored and ordered transfers through management-by-exception when the situation demanded.

(11) On 15 April 1966, a Munitions Office was established under the Assistant Secretary of Defense (Installations and Logistics) (I&L) to ensure full cooperation of all echelons of the Defense Department in the utilization of common items of air munitions resources. This office, staffed with representatives from the Services, the Defense Supply Agency, the Joint Staff, and the Office of the Secretary of Defense, was charged with bringing to bear an intensive management system throughout all command echelons concerned with air munitions requirements, production, expenditures, transportation, inventory control and reporting activity.

(12) The Office of the Secretary of Defense took prompt action in accelerating production of 250 and 500 pound bombs to increase deliveries between April and December 1966 by some 50,600 tons over contract schedules. Deliveries of 750-pound bombs were also accelerated to provide 32,800 tons earlier than previously scheduled, whereas 181 tons of bomb components (fuzes, adapter boosters, cable assemblies) were identified and made available for immediate shipment to SE Asia. U.S. Commander in Chief, Europe (USCINCEUR), was requested to advise the number and locations of complete air munition weapons by type in Europe as well as excess stocks of components applicable thereto. Military Assistance Program (MAP) excess munitions were recovered in the amount of 27,600 bombs. The MK 81, MK 82, M117 bombs and the 2.75" rocket were assigned the highest national priority on 26 April 1966. An automatic "push" distribution of selected air munitions from CONUS to the Pacific and control over production was commenced. An Office of the Secretary of Defense Selected Item Status Reporting System (SISR) was placed in effect in 15 July 1966. Strong, centralized management of air munitions was now being exercised at the Department of Defense level. (See Chapter IV.)

(13) During a subsequent Air Munitions Conference in Hawaii on 31 May to 1 June 1966 the need for solid requirements from the component commanders to CINCPAC was stressed as CINCPAC did not analyze these but only consolidated and transmitted them to the Joint Chiefs of Staff and the Office of the Secretary of Defense. Furthermore, production decisions were initially based on these requirements.⁴⁶ The generation of combat requirements is, in itself, a complex process. For air-to-ground munitions they are a function of (a) the enemy threat and target array; (b) the friendly aircraft engaged, their sortie rates and mission assignments; (c) weapon effectiveness, compatibility, delivery accuracy, availability, cost, and aircraft loading capability; and (d) tactical considerations. Owing to the then current production facilities capabilities, feasibility of new production and the availability of funds, only 80 to 90 percent of CINCPAC's stated requirements were, in turn, allocated by the Department of Defense and a significant portion of the total tonnage consisted of obsolescent ordnance. In a briefing for the Secretary of Defense on July 8, 1966, CINCPAC stressed the point that in spite of best efforts, expenditures at times did not match allocations simply because the desired munitions were not actually in the hands of the users when needed, and emphasized that these under-expenditures not be interpreted as indicating that ammunition was available in excess of requirements and production curtailed accordingly. The determination of the realistic capability to support ammunition allocations must recognize the factors affecting munitions availability, e.g., the inaccuracies inherent in the highly dynamic munitions inventories and in production schedules and the responsiveness of the logistic support systems.⁴⁷

(14) Air munitions continued to be a major problem requiring a continual shift of assets to match components and major items and to find suitable substitutes for the task at hand. Following the rigid control imposed by CINCPAC, Seventh Air Force expenditures dropped to a low point in May—50 percent of comparable March figures—and tons per sortie also reached its

⁴⁵CINCPAC, Letter, Serial 002367, subject: CINCPAC Munitions Briefing and Related Documents, 27 August 1969.

⁴⁶OPNAV, Memorandum, Serial 0057P03W, 6 June 1966.

⁴⁷CINCPAC, Command History, 1966, p. 761.

AMMUNITION

nadir, down 33 percent from March figures. (See Figure C-3.) Strategic Air Command ARC LIGHT deficiencies were less acute as the B-52s were fully compatible with—and in some cases preferred—the so-called "fat" bombs in longer theater supply. However, even though CINCPAC and the Joint Chiefs of Staff subscribed to the idea of 800 sorties per month, the munitions stocks would support a monthly rate of only 450 sorties through November 1966. (See Figure C-2.)

(15) Production of air munitions surpassed consumption in total tonnage in August 1966. By September there were definite signs of improvement, with total munitions receipts up 14 percent while expenditures increased only 2 percent. However, the stock of many items including the projected 1967 stock of heavy bombs (MK 83, MK 84, M118) was still reported to higher authority as critical.⁴⁸

(16) As stockage positions improved, available SE Asia storage capabilities became overcrowded. As a result, CINCPAC commenced a diversion of some excess items to other PACOM areas. On 22 September 1966, the Secretary of Defense stipulated that no diversions of air munitions scheduled for SE Asia from CONUS would be made without the prior written approval of either the Secretary or Deputy Secretary of Defense. A reclama to this policy was submitted by CINCPAC on the basis that consumption of some types of ammunition was less than planned because of adverse weather conditions and other causes. He requested, for purposes of operational and logistic flexibility, that when SE Asia stockage objectives for a specific item were met he be authorized to divert to other PACOM areas to relieve storage facilities congestion in SE Asia as well as to restore Pre-positioned War Reserve requirements.⁴⁹ The Joint Chiefs of Staff advised that to obtain Secretary of Defense approval for diversions, munitions would have to be identified on an item basis together with the tonnage involved by weapon and its recommended storage location plus the cause for the requested diversion.⁵⁰ This was to have a later impact on NE Asia readiness. (See Appendix G.)

(17) In view of this and as the incomplete round problem had improved from a level of 39 percent in June to only 5.9 percent in November, CINCPAC requested that many items of air munitions on automatic "push" from CONUS be placed on a "pull" basis by Pacific component commanders to avoid accumulation of excess stocks in SE Asia. The Secretary of Defense concurred in this request but stated his desire to retain the control then being exercised over selected air munitions by the Assistant Secretary of Defense (I&L) and the Joint Chiefs of Staff through the establishment of the Joint Chiefs of Staff Reserve.⁵¹ (See Chapter IV.)

(18) By the end of February 1967, the crisis in air munitions was under control. The munitions organizations at both Seventh Air Force and PACAF had grown from divisions within their respective Directorates of Supply to independent directorates, fully staffed with highly qualified ammunition logisticians. This was to have profound impact on the responsiveness of these headquarters to changing operational requirements and critical situations. Essentially all Air Force bombs had adequate components and incomplete rounds had ceased to be a major problem. March 1966 expenditure tonnage had been regained by the Seventh Air Force as had the tons per sortie. (See Figure C-3.) The stabilized force of tactical aircraft in SE Asia and the inherent limit of aircraft sortie generation precluded radical surges in expenditures such as were experienced with ground and ship gun ammunition. Even the Tet and Spring Offensives of early 1968, although it resulted in surges in the expenditures of selected items such as MK 24 flares, 2.75" scarfed marking rockets and 7.62mm ammunition for gunships, did not create significant problems. The unprogrammed increase in B-52 sorties from 800 to 1800 per month in early 1968 involved only the MK 82 and M117 bombs, and in-theater and in-transit assets were adequate to meet requirements until production of these items could be accelerated. Notwithstanding this relatively stable posture, stringent controls over munitions programs, production, allocation and distribution were to remain in effect.

⁴⁸CINCPAC, Message 270002Z September 1966.

⁴⁹CINCPAC, Message 220107Z November 1966.

⁵⁰JCS, Message 291917Z November 1966.

⁵¹Secretary of Defense, Memorandum to the Chairman, Joint Chiefs of Staff, subject: Controlled Air Munitions, January 1967.

AMMUNITION

(19) In summary it can be stated that in April 1966 dwindling levels of air munitions in SE Asia led to the curtailment of a sufficient number of planned combat sorties to constitute a critical situation. Contributing causes were imprecise determination of requirements with corresponding low allocation of assets, unplanned volume of B-52 sorties, marginal compatibility of much of the air munitions stockpile with modern jet aircraft, incomplete rounds magnified by the absence of a safety level of operating stocks, lag in production build up, and dependence on reporting systems inadequate for a rapidly escalating tempo of combat air operations. Resulting extraordinary actions included the establishment of CINCPAC control of allocations of available PACOM air munitions between competing Service requirements, the institution by CINCPAC of a 45-day SE Asia stockage objective based on allocation rates, the drawdown of available CONUS stocks including Atlantic Fleet reserves, and the establishment of the Munitions Directorate in the Office of the Secretary of Defense. The latter office undertook active management of all aspects of controlled air munitions logistics with initial emphasis on the immediate acceleration of production, the automatic "push" of munitions to SE Asia, and the improvement of reporting systems. Sorties and tons per sortie reached their lowest ebb in May and June 1966 after which time improvement in the SE Asia asset position occurred. By August 1966, production surpassed consumption for the first time which together with essential correction of the incomplete round problem, led to attempts by CINCPAC to reconstitute War Reserves in other areas of PACOM and to revert to "pull" distribution by the component commanders of many munitions types. By February 1967, the Air Munitions Crisis was at an end although shortages of some desired types of munitions continued.

c. Ground Munitions.

(1) In spite of the fact that the overall shortage situation in PACOM with respect to air munitions was showing distinct signs of recovery by late 1966, the ground munitions posture reached its low point. Although the effects were severe, the overall impact of the actual and predictive shortages was narrower in scope and more rapidly relieved than in the case of air munitions.

(2) Army problems essentially had their genesis in the 1965 time frame as previously discussed and revolved around the accuracy of requirements forecasts coupled with budgeting procedures and a production schedule geared thereto. The immediate cause of the problem was the rapid acceptance and implementation of the June 1966 Theater Required Supply Rates, previously discussed prior to a corresponding build up in production.

(3) On 7 September 1966 COMUSMACV advised CINCPAC that eight munitions items essential to support U.S., Vietnamese and Free World Assistance Forces ground combat operations would reach zero or near zero balance in-country in the very near future and that even an immediate production increase would not alleviate the situation within the required time frame. He requested the initiation of urgent action to obtain maximum allocation for combat forces in Vietnam plus expedited shipment in order to preclude severe impact on anticipated sustained combat operations.⁵² This was the source of considerable concern to higher echelons. The following actions resulted:

(a) CINCUSARPAC made an immediate analysis of the ground munitions based on available asset data and on existing Theater Required Supply Rates and concluded that, in addition to the eight items cited by COMUSMACV, there were some 21 other ammunition types which would approach zero availability in Vietnam in the forthcoming months. Department of the Army assistance was requested.⁵³

(b) The Chief of Staff, U.S. Army, directed the formation of the Department of Army Allocation Committee Ammunition (DAACA) on 8 September 1966 to review the status of the reported critical items and to make recommendations in the premises. In recognition of the fact that allocation of available assets would not cure all the problems relating to the criticality

⁵²COMUSMACV, Message 071225Z September 1966.

⁵³CINCUSARPAC, Message 100225Z September 1966.

AMMUNITION

of ground munitions, the Secretary of Defense met daily with key Defense, Army and Marine Corps representatives to review the actions of the DAACA and to expedite corrective actions in production, transportation and reporting. These meetings terminated in November 1966 at which time the Secretary of Defense directed the Army to carry on. The result was the establishment of the Office of Special Assistant Munitions (OSAM) under the direction of the Assistant Secretary of the Army (I&L) with cognizance over 40 items of ammunition, representing 75 percent of the Army ammunition budget. Although the Secretary of Defense established a Ground Munitions Office in the Munitions Directorate, ASD(I&L), the degree of control assumed by this office did not attain that reached by the Air Munitions Office. (See Chapter IV.) This is attributable to the exceptional coordination between the Army and the Marine Corps and the success of the Office of Special Assistant Munitions (OSAM) within the Department of the Army.

(c) COMUSMACV and CGUSARV initiated a penetrating review to find ways by which essential combat operations could be continued while at the same time reducing desirable but less essential ammunition expenditures. It was considered that superior U.S. firepower would have to be employed on lucrative targets in supporting ground operations but that some constraints on harassing and interdiction fires would probably be necessary.⁵⁴ Close control on the use of critical items continued as one of the intensive management actions taken by CGUSARV although this was not considered a long-term solution to the problem.⁵⁵

(d) On 16 September, CINCPAC recommended to the Joint Chiefs of Staff that the Department of the Army take immediate action to divert other worldwide assets to SE Asia to satisfy combat requirements for all 29 items deemed to be in critical supply, including making available CINCUSARPAC war reserves, (approximately 1 month's requirements), if such action should be necessary. He further recommended adjusting production allocations in favor of SE Asia and the expediting of shipping arrangements.⁵⁶

(e) The Joint Chiefs of Staff noted CINCPAC's recommendations and stated that they would advise further when the results of Department of the Army actions, through DAACA, to divert other worldwide assets to SE Asia, to adjust production schedules and allocation of production, and to use expedited transportation were known.⁵⁷

(4) Once again, the Secretary of Defense raised the question of whether CINCPAC or COMUSMACV should be responsible for allocations of ground munitions to all forces within Vietnam, including the forces of the Republic of Vietnam. This would include all resources in-country as well as those designated for shipment and in-transit. The actions involved in exercising this responsibility would include the establishment of compatible stock levels, allocation for expenditure based on known assets, anticipated receipts and consumption allocations, and transferring assets on hand between forces as necessary.⁵⁸ In reply, CINCPAC stated that he would prefer the Services handle the allocation of critical ground ammunition insofar as they were capable. However, should it be determined that centralized control and management were necessary to ensure support to combat forces, CINCPAC was prepared to assume that responsibility. He further recommended that CINCPAC be so empowered.⁵⁹

(5) Proposed resolution was forthcoming from the Chairman, Joint Chiefs of Staff on 9 November 1966. The Joint Chiefs of Staff recognized that inasmuch as COMUSMACV had no responsibility for the Laotian Military Assistance Program or other U.S. commitments outside South Vietnam, CINCPAC must also concern himself with the distribution of critical ground munitions. They also recognized that other priority demands must be considered, such as worldwide training and test requirements and the needs of the other unified commands. Consequently, it was proposed that CINCPAC be authorized to direct his components to transfer or

⁵⁴CINCUSARPAC, Message 122310Z September 1966.

⁵⁵CINCUSARPAC, Message 230848Z September 1966.

⁵⁶CINCPAC, Message 160400Z September 1966.

⁵⁷JCS, Message 202107Z September 1966.

⁵⁸ASD (I&L), Memorandum, to Director of the Joint Staff, J-4 (Logistics), subject: Allocations of Ground Munitions in Vietnam, 24 October 1966.

⁵⁹CINCPAC, Message 262214Z October 1966.

AMMUNITION

divert assets on-hand or enroute, as required by military operations, while COMUSMACV be authorized to divert shipments of ground munitions or transfer assets in inventory in-country to any desired recipient as required by military operations.⁶⁰

(6) Implementation of these proposals was effected in mid-December. Only six items were listed in the critical category at that time, but CINCPAC was authorized to add and delete items on the list. The Department of the Army was to furnish monthly forecasts on 6-month availability of critical items, and on the basis of reports from PACOM commanders, CINCPAC was to furnish the Department of the Army with the desired allocations each month.⁶¹ This procedure became effective with the January 1967 production and continued until August 1967 at which time the function was taken over by the Military Services Ammunition Allocation Board (MSAAB), which included CINCPAC representation. At the end of the year the most critical PACOM ground munitions items were 5.56mm ball, 60mm HE, 60mm Illuminating, 81mm HE, 81mm Illuminating, 105 HE, and 4.2" HE cartridges.⁶²

(7) The shortages of ground munitions associated with the "Ground Munitions Crisis" of September 1966 did not interfere with military objectives in the broadest sense. Their impact may be assessed as follows:

- (a) Shortage problems were localized geographically.
- (b) Greater use of indirect fire missions—primarily air delivered—was required.
- (c) Ground commanders occasionally were required to modify concepts of some tactical operations.
- (d) Ground and air interdiction was reduced.
- (e) Considerable limitations were imposed on use of night illumination.⁶³

(8) There were, however, ancillary problems and effects of considerable significance, such as:

(a) During early 1967, the development of accurate weapons density information had to be brought under Department of the Army control with approved weapons listing furnished to all elements of command to be used simultaneously by all concerned. This has since been delegated to the Army Materiel Command.

(b) Intensive management, as practiced in procurement and production of ammunition, used the U.S. industry technique of dependence on needed assets coming direct from the production line rather than dependence upon inventory stockpiles. This technique reduced adequate and timely response to increased consumption needs. There was no surge tank in the form of an inventory stockpile to maintain response to the dynamics of increased consumption after initial reaction.

(c) Program and budget tasks that had been the responsibility of the Army Materiel Command were taken over by the Department of the Army as part of the intensive management activity.

(d) Under the auspices of DAACA, the supply posture of each overseas command was intensively reviewed with the objective of making any accumulated overages immediately available to SE Asia. A more rapid rotation of stocks and purification of excesses resulted.

⁶⁰JCS, Message 092311Z November 1966.

⁶¹JCS, Message 162332Z December 1966.

⁶²CINCPAC, Command History, 1966, p. 763.

⁶³COMUSMACV, Command History, 1966, p. 253.

AMMUNITION

(e) In January 1967, the theater Inventory Control Point (ICP) at USARPAC was reorganized into the Theater Material Management Agency with the concurrent expansion of the ammunition branch to a directorate employing 42 people. Unlike other supply functions, that for ammunition was retained at the theater level and was the only commodity in USARPAC to be truly centralized in terms of supply management.⁶⁴

(f) Tightened control of transportation reduced pipeline in-transit time from 120 to 90 days.

(g) Beyond the immediate 6-month period, production was expedited and increased to provide necessary assets.

(h) As in the case of air munitions, a timely, comprehensive ADP reporting system for ground munitions evolved.

(i) As in the case of air munitions, the seemingly unsatisfactory worldwide posture of some ground munitions became the subject of increased attention and criticism by the Senate Preparedness Investigating Subcommittee.⁶⁵

(9) Following the resolution of the above situation, problems associated with ground munitions consisted primarily of adjusting requirements through establishment of appropriate rates of supply to avoid situations of acute surplus or deficiencies in worldwide stocks in general and SE Asia stocks in particular. (See Chapter IV.)

(10) The Army of the Republic of Vietnam (ARVN) rates, similar to those set forth in USARPAC Regulation 710-15 for USARV, were developed by CINCPAC in July 1967 and approved by the Joint Chiefs of Staff in November 1967. These rates coupled with an approved weapons density listing became the basis for support of ARVN forces. Stockage objectives thus developed included 90 days of support for in-country forces.⁶⁶

(11) Stockage objectives based on then existing rates generally proved adequate for the support of USARV forces during the Tet and Spring Offensives of 1968 although air shipment of some short supply items was found to be necessary. By November 1968, the high consumption experienced during the Tet Offensive had shown a marked reduction and USARV was becoming dangerously overstocked with ammunition. In addition to a change in rates, (see Chapter IV), the 1st Logistical Command (USARV) implemented a concept of supply management known as inventory in motion. (See Chapter VI.) After some initial miscalculations as to ship arrivals and stocks to be maintained on the ground (by individual item) the system leveled off to a meaningful management technique for its purpose, although some maldistribution of stocks between USARV and ARVN continued to exist.⁶⁷

(12) The Marine Corps Class V(W) ammunition logistic system implemented on 16 August 1965 continued to remain in effect except for some refinements in system operations and improvements in administrative and reporting techniques. During the Tet and Spring Offensives of 1968 and subsequently, a combination "push-pull" system was utilized with some direct shipping to Vietnam employed. However, the Naval Ordnance Facility, Sasebo remained the focal point for ammunition.

(13) In summary, with the opening of LOCs in Vietnam and corresponding escalation in the tempo and scope of ground operations in 1966, ground ammunition expenditure rates rose sharply. Although these increases had been predicted, insufficient time was available to build up production accordingly. The result was an actual or predicted drawdown of some 29 items to

⁶⁴USARPAC, Presentation to the JLRB, subject: Ammunition Logistics in USARPAC, 6 August 1969.

⁶⁵U.S. Congress, Senate Committee on Armed Services, Preparedness Subcommittee, subject: Report of the Preparedness Investigating Subcommittee on the Status of Munitions in Southeast Asia, 8 February 1967.

⁶⁶DCSLOG Memorandum, subject: Ammunition Logistics in Support of SE Asia Operations, 1965-1968,

5 September 1969.

⁶⁷Ibid.

AMMUNITION

dangerously low levels. Although superior U.S. firepower continued on lucrative targets, it became necessary to reduce extensive harassing and interdiction fires and exercise constraints through the imposition of stringent Available Supply Rates. The Secretary of Defense assumed intensive surveillance of principal ground munitions items through the establishment of a Ground Munitions Office, later to become the OSD Ground Munitions Directorate. This surveillance extended primarily to a monitoring of budgets and production schedules with primary management assigned to and exercised by the Secretary of the Army through the Office of Special Assistant Munitions (OSAM). The CINCPAC was given authority to control allocations of critical ground munitions by exception from December 1966 to August 1967 after which time this function was absorbed by the Military Services Ammunition Allocations Board (MSAAB). Improved requirements determination together with the achievement of corresponding production schedules remedied the critical situation after which time the alleviation of excess stocks of ammunition on the ground in Vietnam became the leading ground munitions problem.

d. Naval Gunfire Support (NGFS) Ammunition

(1) As noted earlier in this chapter, serious shortages in Naval Gunfire Support Ammunition were experienced during the buildup phase, reaching a low ebb in mid-1966 when 5"/38 stocks available to the Pacific Fleet dropped below shipfill levels for approximately eight months. (See Figure C-4.) In December 1966, an additional 50,000 5"/38 Variable Time (VT, also called proximity) fuzed projectiles were converted to High Explosive-Point Detonating (HE-PD) rounds, bringing the total so converted over a period of a little more than a year to 200,000, with corresponding degradation of the antiair warfare posture. First Fleet units were required to reduce their 5" Antiaircraft Common/High Capacity/High Explosive (AAC/HC/HE) loads to 25 percent of allowance. In the Seventh Fleet, VT projectiles were substituted for 75 percent of the AAC projectiles in attack and antisubmarine warfare support aircraft carriers.⁶⁸

(2) A review of CINCPAC Critical Item (FLAG POLE) reports and Logistic Summaries (LOG SUMS) indicates critical periods for gun ammunition types as shown in Figure 9. An analysis of representative items is contained in Appendix D.

(3) One of the major contributing factors to this was the pronounced increase in the tempo of operations coupled with worldwide asset shortages which continued from time to time until mid-1968. As ground operations in South Vietnam escalated, so did supporting gunfire support expenditures. In mid-1966, CINCPAC, in an effort to take advantage of available naval forces and to relieve concentration of enemy defenses against ROLLING THUNDER strikes, recommended the initiation of Naval bombardment against North Vietnamese coastal targets. On 15 October 1966, authority was granted by the Secretary of Defense to conduct surface ship operations against waterborne traffic in coastal waters south of 17°30' North Latitude, with shore bombardment limited to self-defense situations. These operations, conducted under the nickname SEA DRAGON were initiated on 25 October. The northern boundary of SEA DRAGON was extended to 18° on 11 November 1966 and on 27 February 1967 to 20° North Latitude. Coincident with the latter date, authorization was increased to include the conduct of naval gunfire against military and logistic targets alone.⁶⁹

(4) With this authorization to bombard North Vietnam came a sharp rise in SE Asia naval gun ammunition consumption, from a level of 747 tons per month to 2100 tons per month. At this time four naval gun ammunition items were added to the list of ground munitions under intensive management by the Office of the Secretary of Defense. This number was later increased to nine items.⁷⁰ Controls so exercised were similar to those in effect for Army ground munitions; budget and production control, plus program analysis and monitorship, with the remaining functions vested in the Assistant Secretary of the Navy (Installations and Logistics) and the Office of the Chief of Naval Operations. In May 1967 production was authorized to go from 1700 tons per month to 4000 tons per month as compared to an initial 30-day high of 2700 tons per month

⁶⁸COMSERVPAC, Operations of the Service Force, U.S. Pacific Fleet, FY 1967, p. 12-20.

⁶⁹Sharp and Westmoreland, Report on the War in Vietnam, pp. 49-51.

⁷⁰OASD(I&L), Memorandum, 15 February 1967.

AMMUNITION

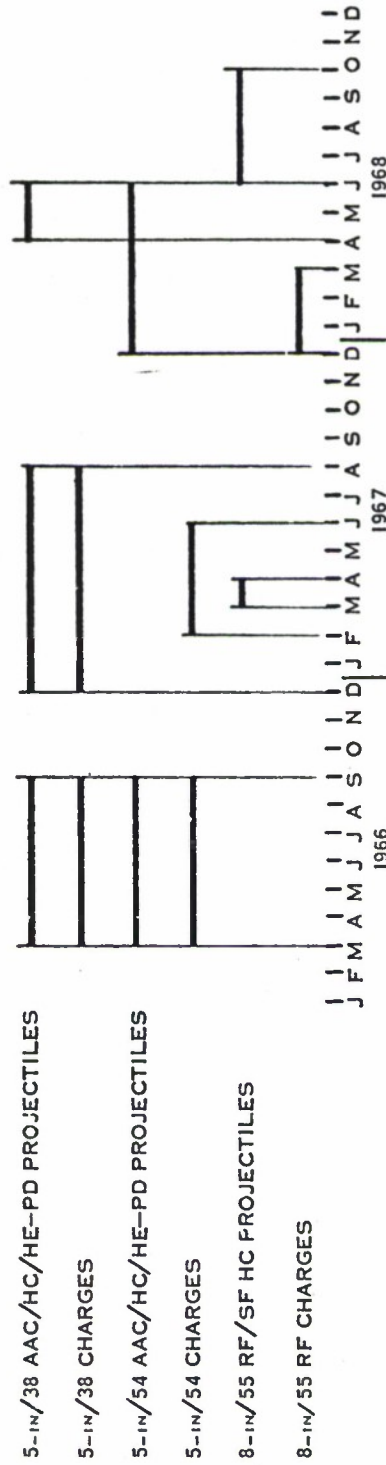


FIGURE 9. CRITICAL PERIODS-NAVAL GUNFIRE SUPPORT AMMUNITION

Source: CONSERVPAC, Operations of the Service Force, U.S. Pacific Fleet, FY 65, 66, 67, and 68.

AMMUNITION

during October 1967. As the worldwide inventory position became more favorable, the naval gun ammunition production base was cut back to a rate of approximately 2800 tons per month.⁷¹

(5) Similarly, the Navy cut back on its gun ammunition program during the formulation of the FY 69 budget in September 1967. The high cost of procuring the authorized D-to-P in a single year led the Secretary of the Navy to accept an interim inventory objective of 90 days for non-engaged forces. (See Chapter IV.) Further, as the increased consumption rates predicted by Commander in Chief, Pacific Fleet, in connection with SEA DRAGON had not fully materialized, predicted expenditure rates were reduced to an average of the experience of the preceding four months with a corresponding impact on pipeline quantities. It was estimated at that time that, in view of the hot production base, this program would cover expected combat and training usage and provide the necessary SE Asia pipeline. In addition, it would provide or maintain minimum reserves for nondeployed forces commensurate with an acceptable readiness posture until the end of hostilities in SE Asia at which time full D-to-P stocks would be acquired.⁷²

(6) With the advent of the Tet and Spring Offensives of early 1968, combat consumption of gun ammunition peaked reaching a rate almost three times the mean expenditure rate of 5"/38 ammunition experienced during FY 67 and three and half times that of 5"/54 ammunition. Production of projectile bodies and fuzes was not geared to the rapid rise in expenditures. Available supplies of components, including use of some Army fuzes, were rapidly loaded to fill the gap, even though the resultant rounds did not meet all desired operational requirements. Air shipment of 2,784 5"/54 HC and 3,980 AAC projectiles, totaling 250 tons, from the Naval Ammunition Depot, Crane, to Subic Bay was authorized to alleviate the critical shortage.⁷³ Additional drawdown of Atlantic Fleet assets by the Chief of Naval Operations was undertaken. (See Appendix E.) Because of the lack of an adequate reserve to compensate for such unforeseen escalations, the Pacific pipeline dwindled to a dangerously low level. (See Appendix D.) A decision to increase gun ammunition metal parts production was not taken by the Office of the Secretary of Defense until August 1968.⁷⁴

(7) These unprecedented rates also presented an ever-increasing challenge to Underway Replenishment Groups to meet the rearming demands of the ships on the line, normally consisting of one 8"/55 cruiser (CA), two 5"/54 destroyers (DD) or guided missile destroyers (DDG) and three 5"/38 DDs, but peaking to one 16"/50 battleship (BB) or 8"/55 CA, three 5"/54 DD/DDG and four 5"/38 DDs in April-May 1968. As an example, during FY 68, ammunition ships (AE/AOEs) spent an average of 84.1 percent of their time either on replenishment station, enroute to or from station, or otherwise performing support tasks.⁷⁵

(8) As was true for air munitions, the establishment of improved control of shipments and refinements in ammunition reporting procedures in FY 67 substantially improved the supply situation and shortened shipping time from 90 days to an average of 55 days from production to WESTPAC. These factors, together with increased production in August 1968 and the availability of greater storage and throughput capability at Subic Bay, resulted in a more stabilized gun ammunition posture coincident with the de-escalation policies effected in late 1968.

(9) In summary, although the nonavailability of gun ammunition did not reach crisis proportions during any single period of time, shortage situations did occur—particularly in 5"/38 and 5"/54 types, where it was not always possible to maintain shipfills in all deployed units in spite of curtailment of training, significant drawdown of Eastern Pacific and Atlantic Fleet stocks, conversions of anti-air rounds to bombardment rounds, and use of air lift for critical items in some instances. This was essentially caused by low initial asset position, the time lag in increasing production in line with increased expenditure estimates, and basing procurement programs on past expenditure experience without providing a reserve or "float" to

⁷¹Secretary of Defense, Memorandum, 6 September 1967.

⁷²ASN(I&I), Memorandum, subject: Ammunition Objectives for FY 1969, 22 September 1967.

⁷³CINCPACFLT, Message 150334Z; CNO, Message 151325Z May 1968.

⁷⁴ASD(I&I), Memorandum, 5 August 1968.

⁷⁵COMSERVPAC, Operations of the Service Force, Pacific Fleet, FY 1968, pp. 2-4.

AMMUNITION

compensate for sudden surges in requirements such as occurred at the time of the Tet and Spring Offensives in 1968. Being a service-peculiar commodity, there was no occasion for the exercise of allocation control by CINCPAC. However, certain types were placed on the Department of Defense list of controlled items and made subject to the special attention and monitoring of the Munitions Directorate within the Office of the Secretary of Defense.

4. WORLDWIDE AMMUNITION SUPPORT. Even though primary emphasis on the review of ammunition support during the Vietnam era has been focused on the engaged forces in SE Asia, the impact of providing this support on other major commands and areas is also significant. As has been detailed, the increasing expenditures associated with the Vietnam conflict caused the drawdown of Pacific War Reserve and CONUS stocks, particularly with respect to air and gun munitions. Owing to policies and budget constraints discussed in Chapter IV, emphasis on approved procurement programs was placed on replacing consumption without equal regard for building the stockage objectives of other commands and areas in accordance with the Logistics Guidance of the Secretary of Defense. In this environment, the changing asset needs associated with meeting SE Asia supply rates and stockage objectives, keeping the pipeline filled, and having sufficient assets on hand to meet the contingencies of strikes, suspensions, unforeseen demands and combat fluctuations together had their effect on worldwide readiness posture. A review of this impact on the ammunition readiness of the Atlantic Fleet, the European Command, and Northeast Asia is made in Appendixes E, F, and G respectively.

5. CONCLUSIONS AND RECOMMENDATIONS

a. Conclusions

(1) Throughout much of the Vietnam conflict, a number of types of air, ship, and ground ammunition were in short supply (paragraphs 2 and 3).

(2) Although no major operations were curtailed because of ammunition shortages, expenditures were, at times, asset limited and subject to special controls. On occasions low assets necessitated cancellation of planned Air Force sorties, reductions in ground munition interdiction and harassing fire, and removal of 5"/54 ships from gunfire support tasks (paragraph 3).

(3) A number of factors contributed to shortages of assets: marginal worldwide stocks, marginal initial readiness condition of the production base, high rates of expenditure resulting from the nature of the war and the delivery capacities of modern aircraft, the failure to make initial allowance for conventional weapon bombing by B-52s, insufficient allowance for requirements for surges and escalation of the conflict, a budget influenced policy of providing essentially only for Southeast Asia expenditures, and inadequate provision for production lead times (paragraph 3).

(4) Unbalanced distribution of bomb components during the early months, complicated by the shipment of inert components separately from explosive assemblies in the interest of economy, further degraded the overall air munitions asset position (paragraph 3a).

(5) Superimposed on marginal asset situations, surges in expenditures demanded extraordinary management actions and extra costs associated with such measures as air shipments, shipments from other areas to be replaced later, and operation of production lines at other than optimum levels (paragraph 3).

(6) One of the most important responsibilities of commanders in the field of ammunition logistics is the dynamic and accurate estimation of expenditure rates. This is particularly emphasized in the utilization of weapon systems for which a broad base of experience does not exist. It is essential in the case of ground munitions that all concerned use the same weapons density and that official rate changes be broadcast simultaneously to all affected commands (paragraph 3).

(7) In a dynamic conflict involving major fluctuations in combat tempo, provisions of a reasonable safety level of stocks above estimated consumption quantities is needed to keep

AMMUNITION

continuous pressure on the pipeline during periods of unforeseen escalation and to preclude drawdowns that adversely affect readiness of other commands and areas (paragraph 3).

(8) Transfers of air munitions stocks between Services by Commander in Chief, Pacific, under his authority as a unified commander in emergency situations and of ground munitions in Vietnam by Commander, U.S. Military Assistance Command, Vietnam, under directed authority, prevented serious munitions shortages from reaching crisis proportions (paragraph 3).

(9) Excess air munitions from prior wars, although in many cases obsolescent, provided essential capabilities in the early months in spite of the operational limitations they imposed on modern attack aircraft. The use of these munitions was in some cases delayed because of the fact that some aircraft had not been tested for compatibility with these bombs (paragraph 3).

(10) During the buildup it was found necessary in the case of some Services to increase the centralization and control of ammunition logistics at the Commander in Chief, Pacific, component commander level (paragraph 3).

b. Recommendations. The Board recommends that:

(1) In addition to a normal pipeline to replenish actual ammunition expenditures, the Services be authorized to maintain a level of national assets in support of combat sufficient to respond to emergencies and surges (AM-1) (conclusion (9)).

(2) Services plans for the use of obsolescent munitions held in War Reserves give special attention to testing compatibility of new aircraft with these munitions (AM-2) (conclusion (9)).

(3) The Services plan ammunition storage and distribution by complete rounds to the maximum practicable extent and place emphasis in research and development on reducing to a minimum the number of components necessary to assemble a complete round (AM-3) (conclusion (4)).

(4) Commanders with ammunition logistic responsibility in time of war retain a nucleus staff capability in peace and the Services plan to augment key staffs with qualified ammunition logisticians promptly at the start of a contingency (AM-4) (conclusion (10)).

CHAPTER IV
GENERATION AND CONTROL
OF AMMUNITION PROGRAMS

CHAPTER IV

GENERATION AND CONTROL OF AMMUNITION PROGRAMS

1. INTRODUCTION. In the preceding chapter, the review of ammunition support in the early phases of the Vietnam conflict has shown that in several different munitions categories, stocks on hand and production rates lagged behind the escalating demands of the operational forces. This chapter will examine the generation and control of ammunition programs during the Vietnam era, because they were the determining factors of the Service's logistic posture. Overall policy and guidance will first be examined. In recognition of the major impact of funding management on the implementation of stated logistic objectives, national economic policy, Department of Defense budget guidance, and Service budget policies and their relationship to other basic directives will then be reviewed. Because the determination of specific requirements is the vehicle by which inventory objectives are computed and a total program cost placed on the ammunition necessary to support desired force levels, the evolution of requirements determination procedures will be traced. Attention will then be focused on the dynamics of the management controls exercised over ammunition logistics and the migration of detailed decisions to the highest levels of the Department of Defense. Ammunition reporting systems will then be reviewed.

2. POLICIES AND GUIDANCE

a. General

(1) During the Vietnam conflict the Department of Defense pursued two basic philosophies that had profound impact on ammunition logistics. The first was the goal of limiting munitions production to known SE Asian requirements to avoid excess stocks at the end of the conflict. As stated by the Secretary of Defense in July 1966:

"The actions announced today [a 30 percent cutback in munitions production] are designed to avoid accumulation of excesses, such as the \$12 billion surplus in supplies and equipment at the end of the Korean War.... We are procuring all the munitions and equipment we need for Vietnam and elsewhere. This is being accomplished effectively and economically. At the same time, we are taking action to make certain we are not procuring more than we need."¹

The second was the strategy of gradualism, whereby continually increasing military pressure was to be applied by the United States until North Vietnam ceased its support and direction of insurgencies in South Vietnam.² Suffice it to say that these two philosophies tended to work at cross purposes. As the Vietnam conflict progressed, forces were increased by varied increments, each of which required adjustments to ammunition support plans and production schedules, which were designed with minimal slack for surges or changes in expenditure rates. It will be seen that policies and guidance relating to ammunition logistics were therefore subject to frequent modification and redirection.

(2) It would be well to review historical precedent in regard to the desire to minimize post-hostility stockpiles of ammunition. At the sudden end of World War II, the fully mobilized ammunition production capability of the United States was shut off promptly, but massive theater, depot, in-transit and work-in-process stocks remained. The total of ammunition held

¹Office of the Assistant Secretary of Defense (Public Affairs), News Release Number 591-66, Statement by Secretary of Defense Robert S. McNamara, 11 July 1966.

²Sharp and Westmoreland, Report on the War in Vietnam, 1968, pp. 16-17.

AMMUNITION

by the Army (including Air Force bombs but excluding Navy assets) amounted to 8 million tons, valued at about \$8 billion. The magnitude of this stockpile was a major contributing factor to the minimal purchase of new ammunition between the end of World War II and the Korean War--notwithstanding the imbalance in ammunition types. These proved of value, but shortfalls occurred as total artillery and mortar ammunition expenditures during the Korean War were 57 to 67 percent of those experienced in all World War II, despite the much lower number of troops involved and shorter duration of conflict.³ Serious shortages existed in selected types of munitions until production could be established.⁴ In the post-Korean era, a similar situation occurred, with similar results. For example, Air Force stocks at the start of the Vietnam War totaled 320,000 tons, valued at \$1,171 billion--over three times the then recognized total War Readiness Materiel requirement--but shortages of selected items were soon being experienced.⁵

b. Logistics Guidance

(1) The basic policy directives on ammunition logistic posture are the Secretary of Defense's annual Logistics Guidance, documents that establish the basic framework comprising the policies, rules, assumptions and planning factors on which logistic programs are to be based. The guidance, encompassing materiel, services, and personnel, are used as the basis for the preparation and the justification of the budget submissions to the Department of Defense, the Bureau of the Budget, the President, and the Congress. The terms of the Logistics Guidance and the manner in which it is implemented through the requirements determination and budgeting processes determine what the logistic readiness posture of the four Services will be at some future point in time.

(2) Logistics Guidance includes statements of policy in the following areas:

- (a) The authorized force levels.
- (b) The activity levels to be sustained.
- (c) The combat durations to be utilized for computation of ammunition stockage objectives.
- (d) Rules for computation of peacetime ammunition requirements and mobilization training needs.
- (e) The criteria to be applied to determine the quantities of War Reserve munitions that will be procured.
- (f) Guidance on modernization of inventories.
- (g) The extent of support to Allied forces that will be provided.

(3) Appendix H summarizes Logistics Guidance during the Vietnam era insofar as it related to ammunition. Rather than a requirements-oriented document forming a base to which adjustments could be made for fiscal reasons and the impact evaluated, ammunition logistic guidance became highly unstable as the combat situation changed and efforts were made to cut obligations and expenditures to an absolute minimum at each point in time. Fiscal considerations appear to have had an overwhelming influence on the changing rationale, changing criteria, and assumptions concerning the end of the Vietnam conflict and duration of possible wars in other areas.

³Maj. Gen. W. O. Reeder, The Korean Ammunition Shortage, Case Materiel for Teaching Purposes, Syracuse University, undated.

⁴U.S., Congress, Senate, Committee on Armed Services, Ammunition Shortages in the Armed Services, Hearings, before the Preparedness Subcommittee No. 2 of the Committee on Armed Services, Senate, 83d Cong., 1st sess., 1953.

⁵Hq. USAF(AFSDC), Letter, subject: Logistic Posture at Start of the Vietnam Build-up, 13 May 1969 (CONFIDENTIAL).

AMMUNITION

(4) As noted in Chapter II, the Logistics Guidance for preparation of the FY 65 budget specified support levels of 6 months for General Purpose forces, except for the Army which was authorized D-to-P stocks. Production was to be programmed to achieve these levels in 4 years. Guidance was changed in the fall of 1964 for the FY 66 budget whereby Army NATO forces were made an exception to the D-to-P policy.

(5) By the time the FY 68 Logistics Guidance was prepared, the Vietnam buildup was underway. This guidance included a general increase in force levels, and authorized stocks for B-52 bombers for the first time. This was accompanied by a drastic decrease in the levels authorized tactical aircraft committed to the European theater. The budget assumption was made that only the first phase of the buildup would be implemented; that the temporary forces added for the SE Asia situation would disappear by 1 July 1967; that forces, manpower and costs would be programmed on the basis that SE Asia hostilities would have ended by then; and that the remaining forces would be at peacetime levels.

(6) Following the ammunition crises of the spring and summer of 1966, major revisions were made in the Logistics Guidance for FY 68. This extended D-to-P to all except NATO forces and addressed SE Asia consumption pipeline, and operating and safety levels for the first time. It also provided for an extension of the war through production lead time after the end of the fiscal year.

(7) Following the first Record of Decision on 20 June 1967, Logistics Guidance for FY 69 was revised three times; on 5 July 1967, 11 December 1967, and 9 January 1968. Forces were divided into four categories, each with criteria with regard to authorized stock levels. A "paper work" transfer of an Army reserve division from the Indefinite force category to the NATO support category reduced its ammunition authorization. Similarly, transfer of over 500 Air Force tactical aircraft from the NATO support role to the Other Forces category reduced their combat ammunition authorization to only training quantities.

(8) In summary, Logistics Guidance during the 1965-1969 period was marked by frequently varying force structure alignments and munitions support criteria. Certain of these changes reflect incremental readjustments to support the war in SE Asia. These changes tended to be after-the-fact acknowledgments of increased force requirements in SE Asia, and changes in the tempo of operations. Other changes, though they did not directly address ammunition, had significant impact on ammunition stockage objectives. These changes in the guidance, coupled with variations in expenditures and fluctuations in the allowances in operating and safety levels and pipeline quantities as a direct multiple of the changes in monthly requirements, contributed to the instabilities and frequent changes in worldwide inventory objectives. (See Appendix D.)

c. Funding Constraints

(1) The planning and programming actions of the military Services were oriented toward implementing the Logistics Guidance in such a manner as would attain the necessary materiel readiness to provide and sustain the operational capabilities of their forces. The allocations of these funds were subject to programming controls, promulgated on the basis of risks in the light of the monetary constraints of national political and economic policies, rather than solely military requirements. The impact of these fiscal limitations on military planning and programming was sometimes accompanied by a tendency to interpret the Logistics Guidance in a manner as to conform to these dollar constraints, and sometimes even to change stated requirements. (See Appendix D.) In the final analysis, the force level limits and finite combat durations specified in Logistics Guidance are the result of a tradeoff between acceptable military risk and an economically acceptable military budget. This, however, is only the first of many controls over military posture dictated by financial constraints. To provide an appreciation for these, the FY 69 ammunition program will be traced from the first issuance of the FY 69 Logistics Guidance on 20 June 1967 through the Department of Defense Apportionment requests in October and November 1969. The FY 69 budget was selected for review as supplemental budget submissions in earlier years preclude a clear portrayal of the impact of the budget process on ultimate procurement.

AMMUNITION

(2) The FY 69 Logistics Guidance has been described in Appendix H, with force guidance data illustrated in Tables H-2 and H-3. Department of Defense Budget Policy Guidance for FY 69 budget was issued on 16 June 1967 to support this Logistics Guidance.

(3) The FY 69 Budget Guidance contained the general provisions that there would be no FY 68 SE Asia supplemental budget unless troop deployment plans changed significantly, and that FY 69 budget estimates would provide for the required level of readiness for all U.S. forces—with full support for operations in SE Asia. Certain ground rules were specified for computation of SE Asia requirements. It was to be assumed that hostilities would continue indefinitely at the levels and activity rates programmed, with the further assumption that deployments through the FY 69 reorder lead time would be maintained at the level approved as of 30 June 1968; it was specified that consumables would be provided through reorder lead time. Finally, support of forces other than those deployed for support of operations in Vietnam were to be programmed at peacetime activity levels.

(4) The Budget Guidance also contained directives relating to procurement. For the 284 controlled items under intensive management (of which 130 were ammunition items), procurement was authorized to meet the hot base inventory requirements. For other items, in view of the reliance that was placed on the hot production base, it was to be assumed that provisions of initial allowances and replacement of combat consumption that was anticipated during the FY 69 funding delivery period would be adequate to ensure the combat capabilities required by Logistics Guidance. It was directed that budgets be prepared which would provide for the combat capabilities set forth in Logistics Guidance, but full recognition of the state of readiness provided by high production rates in effect would be recognized, and approximate offsets made in gross requirements calculations. It was noted that relief from these general rules could be requested by the Services if believed necessary to ensure the required combat support posture.⁶

(5) Generally, there was no question that the Logistics Guidance was the prime document on which to base materiel requirements, for the Secretary of Defense had advised the Services as follows:

"I understand that there may be some misunderstanding as to the priority of logistics guidance versus the budget guidance. I want to repeat what I have said many times before: I expect that the Service Secretaries will submit budgets sufficient to support the logistics guidance—there can be no exception to this."⁷

However, as stated support requirements were developed and converted into specific costs, the overriding nature of budget constraints became more evident. Although Logistics Guidance took into account military risks weighed against economic considerations, further adjustments were made to inventory objectives. To cite one specific example, on 13 June 1967, in reference to the "for comment" issue of the Logistics Guidance of 29 May, the Secretary of the Navy stated, in regard to support of the Forces for Combat of Indefinite Duration:

"It is my contention that the authorization to procure combat essential equipment for only six months cannot possibly provide the capability to fight indefinitely, since the lead time required to obtain additional stocks for almost all equipments is greater than six months and also exceeds the lead time required for secondary items and ammunitions."⁸

When the first review was made of the proposed ammunition budget 3 months later, the Secretary of the Navy drastically revised his position. He considered a proposed \$3 billion estimate for ammunition too high, and met with the Secretary of Defense to request the Logistics Guidance be

⁶Assistant Secretary of Defense (Comptroller), Memorandum to the Service Secretaries, subject: FY 1969 Budget Estimates (U), 19 June 1967 (CONFIDENTIAL).

⁷Secretary of Defense, Memorandum to the Service Secretaries, 26 August 1966.

⁸Secretary of the Navy, Memorandum for the Secretary of Defense, subject: DPM on General Purpose Force Requirements and Logistics Guidance, 13 June 1967 (SECRET).

AMMUNITION

changed to decrease the quantities of ammunition authorized. Specifically, he suggested ammunition support of the Indefinite Combat Forces be reduced from D-to-P quantities to 90 days of stock.⁹ As a result of this meeting, the Secretary of Defense issued the following guidance:

"I understand that the Services, in complying with the 'logistics guidance' for FY 69, have prepared preliminary budgets for ammunition substantially in excess of what the Secretaries believe they require.

"Please discuss with the Service Secretaries the changes which should be made in the 'guidance' to reduce the budgeted quantities to the amounts necessary to support the 'required combat capability'."¹⁰

(6) Such adjustments are even more clear when the budget history of FY 69 is traced, beginning with the initial submissions and ending with the FY 69 submissions of estimates as included in the FY 71 budget. It must be recognized, however, that although similar in many respects, the budget process as exercised by the separate Services were at variance. Of particular significance was the number of formal budget submissions. The Army submitted two—a combined Presidential Budget and Department of Defense Budget in November 1967 and an Apportionment submission in June 1968—and then presented an adjusted budget in December 1967. The Air Force submitted three formal budgets: the Department of Defense budget in October 1967, the President's Budget in January 1968, and the Apportionment submission in June 1968. The Navy submitted three formal budgets: one to the Department of Defense in October 1967, the President's Budget in January 1968 (designated by the Navy as the Congressional submission), and the Apportionment submission in June 1968. Taking these variances into account and combining or breaking out figures as necessary to achieve a means of comparison, Table 4 was constructed to illustrate the revisions that took place in budget estimates.

(7) The initial control exercised over Service budget estimates by the Secretary of Defense is with the issuance, through his Comptroller, of Program Budget Decisions (PBDs). The PBDs are issued after extensive review of Service estimates and include alternative estimates with supporting rationale. If the Secretary of Defense accepts an alternative, the Services can submit a reclama, after which a final decision is rendered by the Secretary of Defense. The impact of this procedure on the attainment of munitions support requirements can be illustrated by representative examples.

(8) The initial FY 69 Army budget estimate for controlled ground munitions (47 items subject to intense management) involved \$2,023.4 million of the total munitions budget request of \$2,757.5 million. The Assistant Secretary of Defense (Comptroller) proposed two alternative estimates, of \$2,003.6 and \$1,954.9 million, respectively. The first alternative took into account: (a) adjustment of consumption estimates where later information was available, (b) correction of assets based on later information, (c) evaluation of inventory objectives, and (d) reduction of lead time on certain items. The second alternative included the same analysis, but also limited objectives for certain items where usage experienced had been below plans in preceding months. The Secretary of Defense approved Alternative 2.¹¹ The Army submitted a reclama citing the need for increased quantities of five munitions over the levels approved by the Secretary of Defense. The Army did not, however, seek to raise the revised budget estimate of \$1,954.9 million, stating they would meet those needs through Reprogramming action. The fact is therefore clear that this \$68.5 million reduction was in no way related to a change in requirements, but a purely fiscal constraint on Army munitions procurement.¹²

⁹Chief of Naval Operations, Internal Memorandum from OP-405 to OP-04, subject: Logistics Guidance for Ammunition (U), 28 September 1967 (SECRET).

¹⁰Secretary of Defense, Memorandum to the Assistant Secretaries of Defense for I&I and SA, 22 September 1967 (SECRET).

¹¹Program Budget Decision Number 382, Army Controlled Ground Munitions (U), 16 December 1967 (CONFIDENTIAL).

¹²Department of Army, Reclama of Program Budget Decision Number 382, Army Controlled Ground Munitions (U), undated (CONFIDENTIAL).

AMMUNITION

TABLE 4
FY 69 MUNITIONS BUDGET CHRONOLOGY, IN MILLIONS OF DOLLARS

<u>Submission to:</u>	<u>Date of Submission</u>	<u>Budget Year of Submission</u>	<u>Army</u>	<u>Navy</u>	<u>Air Force</u>	<u>Marine Corps</u>	<u>Total</u>
Department of Defense	Oct-Nov 1967	FY 69	\$2,757.5	\$1,055.1	\$2,496.0	\$691.0	\$6,996.1
President's Budget	Jan 1968	FY 69	2,636.9	914.9	2,017.8	536.0	6,105.6
Apportionment	June 1968	FY 69	2,636.6	914.9	1,988.3	538.3	6,078.1
Department of Defense	Sept-Nov 1968	FY 70	3,207.1	1,077.1	2,053.4	454.5	6,792.1
President's Budget	Jan 1969	FY 70	2,962.9	922.7	1,941.9	454.2	6,281.2
Revised President's Budget (Nixon)	Apr 1969	FY 70	2,962.9	892.7	1,833.3	454.2	6,143.1
Apportionment	June 1969	FY 70	2,962.0	844.4	1,752.3	455.5	6,014.2
Department of Defense	Oct-Nov 1969	FY 71	2,913.0	760.5	1,888.4	440.0	5,801.9

Source: Extracted from official Service Budget Submissions, FY 69-FY 71.

AMMUNITION

(9) Similarly, the air munitions budget was also altered. However, certain reclama actions of the Services were accepted, and a change to the PBD was issued. A comparison of the air munitions budget estimates, in millions of dollars, is as follows:

<u>Service</u>	<u>Service Submission</u>	<u>First PBD</u>	<u>Service Reclama</u>	<u>Revised PBD</u>
Army	\$ 336.2	\$ 336.2	\$ 380.5	\$ 380.5
Navy	948.1	783.1	948.1	796.3
Air Force	<u>1,962.1</u>	<u>1,526.2</u>	<u>2,062.4</u>	<u>1,647.1</u>
Total	3,246.4	2,645.5	3,391.0	2,823.9

The rationale expressed by the Secretary of Defense for the funding reduction in his initial PBD was that:

"No inventory accumulation has been provided inasmuch as the existing inventory of munitions together with a hot production base, which is capable of expansion, should be adequate."¹³

This is evidence that the Services were still being prevented from funding for the hot base D-to-P inventory objective specified in Logistics Guidance and the risks inherent in relying upon expansion capability of the production base were being accepted. As of the end of 1968, many ammunition items were still far below such requirements. For example, the Navy was substantially below hot base D-to-P stocks in the case of air and ship-gun ammunition.¹⁴

(10) The increases approved as result of these reclama submissions were related to additional munitions for classified projects (Army), adjustments in air-to-air missile programs (Navy) and increased B-52 sortie authorizations (Air Force). Although the Services submitted further reclaims, amounting to an \$87.0 million increase in the approved alternative estimate of \$2,823.9 million to \$2,910.9 million, the Secretary of Defense stated in his final PBD:

"The reconsideration alternative estimate [of \$2,823.9 million] reconfirms the basic program provided in the previous PBD, but allows for changes in line items as shown in attachments."¹⁵

This statement provided the Services with the authorization to increase and decrease the quantities and dollar amounts of individual line items, as long as the total dollar amount remained unchanged. This again illustrates the overriding constraint of budgetary limitations on stated and programmed requirements.

(11) To summarize, the above exposition of fiscal restraints taking precedence over stated military requirements is of necessity rather limited. Discussions and interviews with responsible officials in various offices of the Department of Defense and military Services reveals that in practically all instances, valid documentation in support of budget decisions does not exist. This dearth of written rationale relates to interpretation and implementation of both Logistics Guidance and Budget Guidance. Although there is a tendency for personnel at all echelons to claim full support of Logistics Guidance, resultant actions in the form of firm Department of Defense budgets provide, at best, only partial support. This tends to become obscured, however, when budget constraints are supported by after-the-fact interpretations of the Guidance. The constraints imposed by the budgetary process are shown in Table 4.

¹³Program Budget Decision 230, Air Munitions (Controlled), Approved by the Secretary of Defense on 11 December 1967.

¹⁴OPNAV, Briefing for the Deputy Secretary of Defense, 10 February 1969 (CONFIDENTIAL).

¹⁵Program Budget Decision Number 230, Change 1, Revised, Controlled Air Munitions, 27 December 1967. (CONFIDENTIAL).

3. CHANGES IN SERVICE POLICIES

a. General. As outlined in Chapter II, peacetime requirements determination and stockage objective computation were basically complex but straightforward processes of applying theoretical consumption rates to approved force levels for specified periods of time to arrive at required inventory levels. The Vietnam conflict created major turmoil in these computational techniques, as it was a combat operation of a type and scope not clearly envisioned by planners. Not only were many consumption rates that had been established by the military departments found to be inapplicable, but as pointed out above, force levels and logistic support parameters were frequently revised by the Secretary of Defense. Because of the necessarily different nature of ammunition logistics within the different Services, each utilized a unique method of requirements determination, and for the same reason, the definitive statements of the Logistics Guidance had a significantly different cast for each Service. Therefore, the changes in requirements determination techniques and stockage objective computations will be traced separately.

b. Army

(1) Army requirements determination and stockage objective computation, in January 1965, were based on the authorized ammunition levels for each major command, expressed in days of supply. A day of supply, a planning factor for all distribution and procurement planning, was generally expressed in rounds per weapon required for one day of operation, although some bulk items, such as hand grenades and mines, were expressed in terms of quantities per military unit per day. The specific number of rounds authorized per day was prescribed in Supply Bulletin 38-26 (SB 38-26). This bulletin listed different rates for each type of ammunition and for each theater, based on theater mission. Gross requirements per day were established by multiplying the day of supply for each item by the weapon density—the number of weapons in the hands of the troops, developed from Tables of Organization and Equipment. The resultant figure multiplied by the number of days support authorized, plus the quantity authorized for training, provided the theoretical stockage objective. This simplified overview, however, does not take into account two significant factors—not all Army units would be mobilized on D-day and not all units mobilized would be constantly engaged in combat. These considerations had to be taken into account to arrive at a net requirement.

(2) In FY 65, Logistics Guidance specified D-to-P ammunition support for all active duty divisions, but only initial allowances for the high-priority reserve divisions. The Army, however, based their inventory objective on six months support of NATO-oriented divisions and D-to-P support for the remaining divisions, although both forces contained both active duty and reserve units. The inventory objective for the NATO-oriented force was computed at the full SB 38-26 European theater rate for the period from D-day (or deployment day, as applicable) to D+90 for those units in place and those deployed in the first three months of war. Stockage and consumption computation for these forces was reduced to 67 percent of the SB 38-26 rates for the period D+91 to D+180. This lower rate was also used for forces deploying after D+91.

(3) For the remaining divisions, the Army programmed D-to-P support. Computations for divisions in the Pacific were made at SB 38-26 Pacific theater rates for the first 75 days of war, and 67 percent of this rate from the 76th day to P-day. The balance of the force was computed at 67 percent of the applicable theater rate from date of scheduled deployment to P-day.

(4) To the requirements so established, mobilization training authorizations were added for the period from mobilization to 1 month prior to deployment. Next was added a 105-day pipeline for units scheduled for deployment to Europe and 120 day pipeline for units scheduled for deployment to the Pacific, both calculated at the D+180 consumption rate. Finally, the production that could be delivered between D-day and P-day was subtracted to arrive at the final Army Acquisition Objectives (AAO).

(5) In FY 66, Logistics Guidance specifically designated those divisions to be considered as NATO-oriented, and to be provided only 6 months of ammunition stock, whereas the remaining force was to be supported on a D-to-P basis. The AAO was adjusted to this guidance.

AMMUNITION

Further, the normal combat rates (those applicable subsequent to D+90 in Europe and D+75 in the Pacific) were reduced from 67 percent of SB 38-26 rates to 57 percent for Europe and to 54 percent for the Pacific. This was not a significant change in levels, but a reflection of a new edition of SB 38-62. Also, though not addressed in Logistics Guidance, combat requirements to support forces deployed to Vietnam were programmed, based on 54 percent of the SB 38-26 rate for the Pacific theater.

(6) The FY 67 Logistics Guidance made no change to NATO-oriented forces, but increased the non-NATO forces, which was reflected in the revised AAO. Combat support requirements for U.S. forces in Vietnam were increased. It had been apparent from the onset of U.S. combat operations in Vietnam that the rates established in SB 38-26 for Pacific theater combat (based on World War II and Korean War experience) were not applicable to the type of war being fought. Therefore, FY 67 combat rates were based upon U.S. Army Vietnam (USARV) consumption forecast messages, when possible. For items not so covered, 54 percent of the SB 38-26 Pacific theater rates were used. In June of 1966, U. S. Army Pacific (USARPAC) published USARPAC Regulation 710-15, Ammunition Supply Rates (SEA), and although it was an internal USARPAC document established as guidance for USARV, it was used by all elements of the Army for programming, procurement planning and distribution. The rates it established were called Theater Required Supply Rates (TRSRs). Considerable difficulty was experienced by planners in obtaining accurate weapon densities in SE Asia, which were often changed weekly by message.

(7) In FY 68, Logistics Guidance reduced the support period authorized NATO-oriented forces, and the AAO was adjusted accordingly. Combat support for forces in Vietnam was increased, utilizing rates published in USARPAC Regulation 710-15 and a weapon density list published by the Department of the Army. The USARPAC Regulation 710-15 was revised in late 1967 and approved by the Department of the Army as the official rate authorization document for support of forces in Vietnam. This change utilized the term Required Supply Rate (RSR) in place of Theater Required Supply Rate (TRSR), and provided for procedures to up-date rates as required. Logistics Guidance for FY 68 also authorized procurement of ammunition to fill a 135-day pipeline for SE Asia forces. The Army programmed an additional 15-day stockage, which was included in the AAO to provide a 60-day supply on the ground in Vietnam, a 30-day offshore reserve, and a 60-day stock in-transit to theater.

(8) Logistics Guidance for FY 69 identified forces committed to SE Asia as separate from the remainder of the Indefinite Combat forces. It also reoriented two Army divisions from other categories to the NATO support force. The AAO was revised to reflect these changes. Rates utilized for computation were based on the previous 3 months experience, the previous 6 months of experience, or the RSR of USARPAC Regulation 710-15, whichever was highest. Pipeline requirements were computed using the RSR for 90 days and experience for 60 days.

(9) In November of 1968, a new rate system was established. The high rate of consumption during the Tet Offensive, followed by a period of reduced combat activity and resultant overstockage, led to the adoption of a two rate system. The first, an Intense Combat Rate (ICR), was based on the consumption experienced during the Tet Offensive from February to July 1968. The second, a Theater Sustaining Rate (TSR), was based on the experience of the previous 3 or 6 months, whichever was higher. The 60-day in-country stockage objective was computed using 30 days at ICR and 30 days at TSR. The 30-day offshore reserve was based on the ICR. Pipeline quantities were calculated by using 60 days at the ICR and 90 days at the TSR.

(10) In summary, the basic Army technique of computing ammunition inventory objectives by applying an individual weapon consumption rate to the weapon density for an authorized period of time has not changed. However, continual adjustments were made in both rates and rate determination techniques, with the ultimate adoption of a dual rate system. This was designed to provide adequate stocks for periods of intense combat but still preclude saturation of theater storage facilities when the tempo of combat was low.

AMMUNITION

c. Navy

(1) To place Navy requirements determinations and inventory objective computation in proper perspective, there is need to emphasize the complexity inherent in these calculations. The Navy's capability to wage both offensive and defensive warfare on land and sea, as well as over and under the sea, utilizing a great diversity of weapons and weapon systems, results in the use of a multitude of ammunition types with widely varying consumption parameters. In the early 1960s, requirements were based on directives which were drawn from World War II experience, both for ship gun ammunition and air ordnance. It was recognized within the Navy, however, that substantive changes in the methodology of forecasting air munitions requirements were needed because of the increased reliance on jet aircraft capable of carrying heavier loads because of improved bomb rack design.

(2) In 1960, a small group met informally to analyze Navy ammunition requirements for air-to-surface warfare. By 1962, this informal study was given official sanction by the Secretary of Defense and was broadened to include all phases of naval warfare. A large ad hoc study group was then formed, including the initial group as a nucleus.

(3) In the area of air warfare, the study group made a radical departure from previous analyses in their assumptions on the basic nature of any future conflict. As previously noted, thinking had been dominated by World War II experience—intermittent campaigns with slow aircraft covering long distances, delivering relatively small quantities of ordnance on target. This group, however, analyzed Navy carrier capabilities, aircraft recycle times, and enemy targets and came to the conclusion that any future conflict would employ carriers continuously, at an average engagement rate of 50 percent for each carrier. Additionally, aircraft would be capable of flying many more sorties and carrying more ordnance per sortie than had been previously assumed. The result was an estimated requirement for air munitions about five times higher than previous estimates.

(4) The actual computations of requirements for air-to-surface ordnance were based on the premise that available targets would exceed the capability to attack these targets from the air. The total number of sorties and optimum weapon loads to defeat all targets were then derived by considering (a) the type of aircraft; (b) the allocation of aircraft attack sorties to missions; (c) the enemy threat and target array within each mission; (d) the weapon selection for individual targets of the array, based on tactics, effectiveness, availability and cost; (e) and standard aircraft loading based upon approved aircraft capability. Average load factors were then computed for each type of aircraft by examination of the mix and quantity of munitions carried on each sortie. For example, an aircraft that was programmed to carry six MK 82 bombs on 40 percent of its sorties was considered to carry 2.40 MK 82 bombs on 100 percent of its sorties—a load factor of 2.40. This consumption was performed for each different aircraft load. Combat requirements were then obtained for each type of aircraft by multiplying the calculated load factors by the number of attack sorties authorized support in Logistics Guidance. Although this final step moved from a scenario that was target limited to one that was sortie limited, it provided the operational commander with a mix and variety of weapons that would allow him to fight as the situation dictates.

(5) The remarkable vision of this group's report, published in 1963 as the Non-Nuclear Ordnance Study (NNOS), can best be illustrated by a comparison of actual and forecast expenditures of 250- and 500-pound bombs. Expenditure by the Navy of these items in the peak years of World War II and the Korean War were 270,000 and 191,000 tons, respectively. The forecast made in 1960 for calendar year 1968 was 220,000 tons. The NNOS estimate for 1968 was 1,108,000 tons and the actual expenditure by the Navy in Vietnam during 1968 was 838,000 tons. Had it not been for production limitations, the political constraints imposed on air operations, and the necessity of diverting strike sorties to other purposes because of the unprecedented air defense system in North Vietnam, actual expenditures would undoubtedly have been even closer to that forecast.

(6) The requirements for gun ammunition and surface-to-surface rockets provided for amphibious assaults, land warfare, anti-junk and anti-PT boat support, and defense against air attack. Gunfire support requirements for amphibious assaults and land warfare were based

AMMUNITION

on the number of support missions per day and the number of rounds that would be needed to defeat each target by type for each caliber gun. The other estimates were based upon the number of engagements hypothesized and the rounds required per engagement.

(7) The NNOS estimates for gun ammunition did not achieve the accuracy of those for air ordnance. They did correct a major imbalance of ammunition types that existed in earlier forecasts, which allocated adequate quantities to antiaircraft defense, but seriously underestimated other needs. The number of target junks and PT boats, the increased use of ship gun-fire support for troops in coastal areas, and the requirement for harassing and interdiction fire that would exist in Vietnam were not clearly foreseen.

(8) Antiair warfare requirements were established on a threat basis—that number of enemy aircraft that were to be destroyed by Navy and Marine forces. Provision was made for a mix of air-to-air missiles, surface-to-air missiles and guns that could remove this threat regardless of the tactical options selected by the enemy. Quantities were based on those required for combat, combat attrition and combat support, which included initial allowances and an overhaul and rework pipeline. The antiair operations in Vietnam were not of sufficient magnitude to allow valid assessment of these requirements calculations.

(9) A fourth area—antissubmarine and submarine requirements—utilized analytical techniques appropriate to this specialized type of warfare, but is not within the scope of this study.

(10) The outlined methodologies for determination of aircraft load factors, daily gun-fire support requirements and antiair munitions needs were then integrated with approved force levels and support periods to obtain inventory objectives. This entire effort was so successful that in 1965, the ad hoc study group was replaced by a permanent staff that has continued the analysis of munitions requirements. An annual update, considering the latest experience data, force structure, operational capability, tactical doctrine, weapon system kill probabilities, activity rates and threat factors is published as the Navy's Non-Nuclear Ordnance Requirements (NNOR), and is utilized for all contingency and operational planning.

(11) Logistics Guidance set forth the number of attack sorties authorized ammunition as the basis for ammunition programs. Taking FY 65 as 100 percent, sorties specified by the Guidance were 72 percent in FY 66, 116 percent in FY 67, 163 percent in FY 68, and 189 percent in FY 69. Specific figures are shown in Table C-2. Utilizing planning factors from the NNOR, inventory objectives were modified each year to correspond to this changing guidance in attack aircraft effort and concomitant modernization of the attack aircraft fleet. The only changes made in the NNOR, however, were annual updates to incorporate lessons learned in Vietnam combat, which were stabilized by November 1968.

d. Marine Corps

(1) The Marine Corps does not perform requirements determination or compute stockage objectives for air munitions—the Navy NNOR includes this information. They do, however, develop their own ground munitions requirements and inventory objectives to meet the needs of their amphibious warfare role.

(2) Marine Corps requirements for ground munitions are computed in a manner similar to the Army technique, in that a day of supply (the rounds per weapon required for one day of operation) is multiplied by the weapon density and then by the length of the specified support period to arrive at a total requirement for each item of ammunition. In detail, however, the systems differ. The rates used are published in Marine Corps Order (MCO) 8010.1, Class V Logistical Procedures. These rates were developed during a study which considered possible commitment of Marine Forces in their specialized amphibious role in several areas of the world. It also took into account probable targets, areas to be covered, effectiveness or lethality of ammunition, and mix of weapons. By use of computerized war gaming and other analytical techniques, a detailed and comprehensive statement of ammunition requirements resulted.

AMMUNITION

(3) MCO 8010.1 lists, for each type of ammunition, a basic allowance (that quantity required to effect initial distribution within units prior to entering combat), a combat assault rate (used from D-day to D+30) and an extended operations rate (used from D+30 to cessation of combat). Inventory objectives were established by utilizing these rates in a manner which would support Marine Corps amphibious doctrine. Each major Marine Corps combat element was authorized a mount-out stock consisting of a 30-day supply of ammunition at the combat assault rate and a mount-out augmentation stock consisting of a 30-day supply at the extended operations rate. These stocks were maintained in close proximity to the unit's location. Each element was also authorized a 1st and 2d resupply, each composed of 30 days of ammunition at the extended operations rate, and stored in CONUS depots but earmarked for specific units. This 120-day supply was backed up by non-unit designated ammunition stocks sufficient for the additional 60 days authorized by the Logistics Guidance. It is significant to note that there were no changes in Logistics Guidance as pertained to Marine Corps ground ammunition support from FY 65 through FY 68. Each of the four active divisions was authorized 6 months of support, 1 month at combat assault rate and 5 months at extended operations rate.

e. Air Force

(1) Air Force requirements determination and inventory objective computation accomplished to implement FY 65 Logistics Guidance were gross estimates, rather than scientific or analytical in nature. The shortcomings of this technique were recognized in July 1964, when the Air Force Chief of Staff recommended a permanent Air Staff element be established to analyze nonnuclear munitions requirements on a continuing basis. An ad hoc group began its first effort of scientific analysis of munitions requirements determination in December 1964, and completed its study in October 1965. In November 1965, this group was replaced by a permanent analysis section under the Director of Plans, Deputy Chief of Staff, Plans and Operations, Headquarters, USAF, which has published annual revisions in May of each year since then. These documents, known as the USAF Nonnuclear Consumables Annual Analysis, consist of three volumes; Requirements, Support Data and the Weapons Handbook.

(2) Volume I, Requirements, contains air-to-ground munitions expenditures factors and total quantities of air-to-air and antiradar missiles. The computational rationale of air-to-ground munitions load factors is very similar to that used by the Navy in development of the NNOR. Data is gathered on weapon availability, effectiveness and cost, aircraft types, carriage capability and range, target descriptions, composition and location, enemy air threat, and programmed forces. These variables are then utilized in a computer analysis, which determines the weapons load for various delivery techniques for each type of aircraft and each external fuel tank configuration that will provide maximum target damage at minimum cost. Using a computer for this analysis—which took many months of effort when originally done by hand—provides for a much more rigorous examination of alternatives than does the Navy system. Missile requirements, however, are determined by the Air Force in much the same manner as that used by the Navy.

(3) Total War Readiness Materiel (WRM) requirements for nonnuclear munition consumables are computed by applying the sortie load factors for each type of aircraft to the sorties programmed to be generated by that type of aircraft. The expenditure per sortie factors and missile quantities also provide the basis for the War Consumables Distribution Objectives (WCDO) document. Published by the Air Force Logistics Command, the WCDO identifies worldwide prestockage requirements, by base, for support of wartime aircraft activity.

(4) Inventory objectives must of course be based upon the total force authorized and the established activity rate. Logistics Guidance, in the FY 65 to FY 69 period, authorized ammunition support based upon a combination of those factors, expressed as a specific number of attack sorties. Table C-3 compares the number of sorties authorized with the number actually flown in SE Asia.

(5) It can be readily seen that inventory objectives underwent major fluctuations as sortie authorizations were changed. The authorized numbers for FY 65 and FY 66 were the same. Considering these as 100 percent, FY 67 authorizations were 124 percent, FY 68 155 percent,

AMMUNITION

and FY 69 237 percent. The sorties in SE Asia alone exceeded the worldwide totals in FY 67 and FY 68.

(6) The system and supporting documents addressed above are concerned with Air Force worldwide war readiness posture, not with the on-going conflict in SE Asia. In 1965, stockage objectives for Vietnam were documented in Pacific Air Forces (PACAF) Letter 136-2. This letter authorized a 120 day stock at Clark AB and a 30-day stock in-country and was based on past consumption tempered by known asset availability. The document was superseded by the PACAF Airmunitions Planning and Programming Guide (PAPAPG), first published in October 1966 and updated since then on an "as required" basis. It established the SE Asia airmunitions stockage objectives and distribution system.

(7) The PAPAPG utilizes the same load factor technique as the NNOR and Non-nuclear Consumables Annual Analysis, but applies it in a much more selective and detailed manner. Separate load factors are developed for each type of aircraft, each SE Asian base, and for each month of the year. This allows the ordnance types and quantities to be specifically tailored to the targets normally encountered in each base area of operation, the preferred unit tactics and the seasonal weather variations. The load factors thus developed are applied to base sortie capabilities to arrive at base requirements, and are consolidated to obtain overall SE Asia requirements. These requirements, as published in the PAPAPG, constitute the official statement of Air Force munitions required to support SE Asia operations.

(8) Since establishment of the PAPAPG, SE Asia stockage objectives have been set at a level equal to 45 days of consumption at the programmed daily expenditure rate. The objectives are separately computed for each base, and provide a 30-day operating level and a 15-day safety level. For selected low-use items, the PAPAPG authorizes stockage, by base, in excess of this 45-day level to provide tactical flexibility or surge expenditure capability.

f. Summary. The procedures for computation of ammunition requirement by each of the Services underwent significant modification and change during the Vietnam era. The current techniques of forecasting combat expenditures have incorporated considerably more sophisticated methods than were used in the past, and have ensured a generally acceptable balance between low stock levels and excesses. Similarly, computation of worldwide requirements is now done by greatly improved methods, although procurement against total resultant inventory objectives has not been authorized pending the termination of the Vietnam war.

4. CONTROL OF AMMUNITION

a. General. During the Vietnam era, significant changes took place in management controls associated with ammunition logistics. Essentially every shift in command authority or modification of management policy can be directly attributed to either a forecast or actual shortage of one or more ammunition items. It is in this light that the dynamics of ammunition control will be reviewed.

b. Controls by the Office of the Secretary of Defense

(1) The air munitions crisis of April 1966, detailed in Chapter III, was not only the most serious but also had the greatest impact on the existent controls and management systems. As early as August 1965 CINCPAC had informed the Joint Chiefs of Staff that munitions assets available were not sufficient to meet projected expenditures in 1966, but the situation continued to deteriorate.¹⁶ On 8 April 1966, when COMUSMACV advised that he considered the Air Force munitions status in SE Asia to be in an emergency situation, and that 367 strike sorties had been cancelled in the preceding 5 days, drastic actions ensued.¹⁷

(2) The first step was taken by the Joint Chiefs of Staff, who authorized CINCPAC to assume control of all air munitions in PACOM, regardless of Service ownership, and commit

¹⁶CINCPAC, Messages 132200Z August 1965 and 122305Z February 1966.

¹⁷COMUSMACV, Message 12200/080826Z April 1966.

AMMUNITION

them to operations in SE Asia as he saw fit.¹⁸ This assignment of command authority was in accordance with established procedures, which delineate this power of a unified commander under wartime conditions or in critical situations.¹⁹ Over the next several months, CINCPAC ordered many transfers of assets between the various Services and Military Assistance Programs as critical situations were faced. (See Chapter III.)

(3) One far-reaching consequence of the air munitions crisis was the establishment, on 15 April 1966, of the Air Munitions Office, directly under the Assistant Secretary of Defense (Installations and Logistics). This organization, composed of personnel provided by the Services, was organized to formulate and initiate an intensive management system that would control all aspects of air munition logistics from procurement to expenditure, and encompass all Services. Although the Air Munitions Office was formed to function for only 3 months as a temporary organization, it remained in being until 1 August 1966, at which time the Directorate of Air Munitions was created. This directorate has continued the business of controlling the major aspects of all air munitions, although no formal charter of its mission or responsibilities has ever been promulgated.

(4) Immediate actions were taken by the Office of the Secretary of Defense to:

(a) Accelerate production of MK 81 and MK 82 bombs during the April to December 1966 period.

(b) Contract for M117 bomb bodies on a sole source basis, thereby providing early delivery.

(c) Release significant tonnages of air munitions in reserve and depot stocks for shipment to SE Asia that had not been previously available to CINCPAC.

(d) Make available bomb components for immediate air shipment to SE Asia.²⁰

With high-level attention focused on the needs of the Services for greater ammunition production, this office provided a focal point for staffing information and requests from the Services and Joint Chiefs of Staff in connection with Secretary of Defense decisions. As will be noted later, control was assumed over many details, such as requiring specific approval of each change in production rate. (See Chapter V.) It is noted that (a) an on-going production base for the MK 81 and MK 82, with expansion capability, had long been established by the Navy; (b) the Air Force had initiated an M117 production requirement in the summer of 1965, and the Army had with foresight programmed production so that major expansion was possible; (c) the Air Force had initiated the USAF Southeast Asia Airlift Transportation Pipeline System (commonly referred to as SEAIR) over 6 weeks prior to the Air Munitions Office actions, to provide rapid, responsive movement of priority munitions components; (d) the air munitions made available to CINCPAC were predominantly obsolete and obsolescent items, and included several (such as the AN-M30A1 100-pound GP bomb) for which there was no stated requirement.

(5) The Air Munitions Office also directed an analysis of worldwide assets of 23 key air ordnance items to obtain necessary base-line data for future actions. Although the resultant figures were utilized for initial planning, major discrepancies in Service inventories were revealed. The Air Force suspected that many errors were caused by late or improper reports from the Army (which performed all Air Force CONUS storage and the majority of Air Force munitions production), involving air munitions due-in from procurement, receipts from production, quantities in storage, inventory adjustments and shipments to Air Force consignees. An immediate investigation indicated that this was to a large extent true, and rapid corrective actions were initiated.²¹ Because of this and weaknesses in Air Force in-transit reporting

¹⁸Joint Chiefs of Staff, Message 0837/081946Z April 1966.

¹⁹JCS Pub 2, Art. 30203.

²⁰Department of Defense, Directorate of Air Munitions, Fact Sheet, Air Ammunition, 7 January 1969.

²¹U.S. Army Materiel Command, Preliminary Review, APSA Class V (Ammunition) Support to the USAF, 9 August 1966.

AMMUNITION

techniques, the Air Force directed a special worldwide inventory of all air munitions assets as of 30 April 1966 to reestablish a valid asset inventory. As a result of these problems, the CONUS air munitions assets made available to CINCPAC in April had, by the end of May, fluctuated by approximately 25 percent.²²

(6) Based on inputs from the individual Service component forces, CINCPAC furnished periodically updated requirements to the Joint Chiefs of Staff. These requirements, after review, were then forwarded to the Office of the Secretary of Defense. There, they were further reviewed by the Air Munitions Office (or its successor, the Directorate of Air Munitions) with regard to current production facilities capabilities, feasibility of new production and available funds, and approved production levels established for each type of munition. Ideally, these levels would support CINCPAC's stated requirements, in which case production would be distributed to each user by CINCPAC in the desired quantities. However, owing to lack of funds or limited production facilities, many items of air munitions were not made available in the required quantities. In such cases, CINCPAC allocated these critical items to each user on the basis of operational priority and requirement and, where acceptable, allocated an available substitute munition to make up the deficit. When no acceptable substitute existed, a shortfall in the allocation and subsequent expenditure resulted. Normal sortie attrition due to weather, maintenance, or other factors served to offset most of these shortfalls. Unfortunately, this type of discrepancy between stated requirement and actual expenditure frequently resulted in compounded problems. At times there was a tendency to place more credence in past expenditures than in stated requirements when determining future production rates. Therefore, decreased expenditures, albeit caused by production or fund limitations, often resulted in decreased production rates when increased rates were vitally needed.²³ When operational commanders applied expenditure limitations to conserve munitions types in short supply, this was sometimes evaluated as a reduction in consumption and caused deleterious reductions in production rates.

(7) Air munitions shortages during 1966 resulted in decreased sortie rates for a short period, and decreased tonnage carried per sortie for a lengthier period. These techniques of coping with limited assets were not, however, applicable to ground munitions. Army and Marine Corps weapons were not bound by the sortie constraints of aircraft, nor could they fire less than a complete round of ammunition. Therefore, when ground munitions stocks were low, an allocation system known as the Available Supply Rate (ASR) was used. This system allocated ammunition at a rate that could be supported when insufficient assets were available to meet the Required Supply Rate (RSR). The ASR was therefore a rationing system that imposed on the user a maximum allowable rate of ammunition expenditure.

(8) On 7 September 1966, COMUSMACV advised the Joint Chiefs of Staff and CINCPAC that eight ground munitions items were in critical supply, and requested immediate action to obtain maximum allocations.²⁴ The CINCUSARPAC was quick to advise CINCPAC that in actuality, by February 1967, 29 items would reach zero balance at existent consumption and resupply rates. He advised that this could be negated only by stringent application of ASRs.²⁵

(9) This problem prompted the Chief of Staff, U.S. Army, to direct the formation of a staff committee for the review of ground ammunition allocations, which held its first meeting on 15 September 1966. This group concluded that for the eight critical items cited by COMUSMACV, ASRs would have to be enforced, as neither CONUS stocks nor production capability could support required expenditure rates. Allocation information was dispatched to CINCUSARPAC on 24 September 1966. By late October 1966, this group, known as the Department of the Army Allocation Committee, Ammunition (DAACA), had broadened its cognizance to include all items of ground munitions used in SE Asia.

(10) Shortly after the first meeting of this Army group, the Directorate of Ground Ammunition was formed under the Assistant Secretary of Defense (I&L), organized along the

²²CINCPAC, Command History-1966, p. 756.

²³CINCPAC, Command History-1966, pp. 175-185.

²⁴COMUSMACV, Message 46177/071225Z September 1966.

²⁵CINCUSARPAC, Message GPLO-SM 20727/100726Z September 1966.

AMMUNITION

same lines as the Directorate of Air Munitions.²⁶ They directed the formulation of a special reporting system to monitor all activities for 40 key ground munitions items that accounted for 80 to 85 percent of the ground ordnance tonnage expended in Vietnam. The main control exercised by the Directorate of Ground Munitions was, however, the approval of procurement and production programs.

(11) In mid-December 1966 the Joint Chiefs of Staff authorized CINCPAC to allocate those ground munitions still in critically short supply.²⁷ The CINCPAC performed this function only until August 1967, at which time it was taken over by the Military Services Ammunition Allocation Board (MSAAB). The MSAAB, whose establishment had been proposed by the Army in early 1967, was formed on 20 April 1967. This board, which had members from each of the four Services, was chaired by the Army, the designated Executive Agent. The MSAAB was charged with allocation and control of the distribution and redistribution, on a worldwide basis, of selected items of ground ammunition that were common to two or more Services.

(12) The use of ASRs to ration ground munitions continued to be a necessary measure on various items throughout the Vietnam War. In mid-1968 CINCPAC advised the Joint Chiefs of Staff that there had been a marked increase in the number of ground munitions placed on ASR. At the time of his message, 19 separate ground ammunition items were controlled by this rationing process.²⁸

(13) The Army has noted a tendency for the Directorate of Ground Munitions to authorize only those budget and procurement plans that would replace ammunition expended, without regard to other objectives, which caused additional problems. When expenditures were artificially controlled by use of ASRs, the resultant consumption decreases were utilized as justification to reduce production rates. This reasoning led to repeated problems in obtaining adequate stocks to meet the true requirements of the operational commanders.²⁹

(14) There had been recurring shortages of 5"/38 and 5"/54 Navy gun ammunition since the fall of 1965. In February of 1967, the authority granted the Navy to bombard the coast of North Vietnam resulted in a major increase in naval gun ammunition requirements. This increase, combined with increased consumption, caused on-hand assets to fall far below theater requirements. For example, in April 1967, only 40 percent of the monthly requirement of 5"/54 projectiles were available in WESTPAC.³⁰ As discussed in Chapter III, the Office of the Secretary of Defense assumed detailed control of four naval gun ammunition items.³¹ This intensive management of these four (later to increase to nine) items was similar to that exercised over Army ground munitions, and centered about the monitoring of reports on inventory and consumption, and controlling the details of procurement and production programs of those items used by a single Service.

(15) As in the case of air munitions, the requirement for approval at the Secretary of Defense level for each change in production schedules for these items used only by the Navy resulted in additional steps in the approval and justification process, accompanied by inevitable delays. Previously, production changes had normally been made by the manager under the Chief of Naval Material and the Bureau of Ordnance (later Naval Ordnance Systems Command) in response to CNO guidance as to inventory levels and forecast expenditure rates, taking into account such factors as economic levels of production, new lines, extra shifts and available funds. Now the process was to involve more detailed directives from OPNAV, preparation of detailed submittals for justification and approval, and review within OPNAV and at the Assistant Secretary of the Navy (I&L) level before submittal to the Office of the Secretary of Defense.

²⁶Ground Munitions Office (GMO), Memorandum No. 1, 19 October 1966.

²⁷Joint Chiefs of Staff, Message 1625 162332Z December 1966.

²⁸CINCPAC, Message 161435Z June 1968.

²⁹Department of Army, DCSLOG Memorandum, subject: Ammunition Logistics in Support of SEA Operations 1965-1968, 1 August 1968.

³⁰Naval Ordnance Systems Command, Letter, subject: Ammunition Logistics During Vietnamese War (U), 22 July 1969 (CONFIDENTIAL).

³¹Office of the Assistant Secretary of Defense (I&L), Memorandum, 15 February 1967.

AMMUNITION

(16) An example of the exercise of production control by the Secretary of Defense was delineated in a memorandum to the Service Secretaries in early 1966, in which he questioned the fact that consumption of certain ground ammunition items was significantly below forecast expenditures, and indicated that it would not be necessary to further supplement the FY 66 Budget or to amend the FY 67 Budget unless it became apparent later that year that SE Asia combat operations at high levels would extend beyond June 1967 or unless commanders proposed force deployments substantially in excess of those provided for in PHASE IIA.³² It should be noted that the reduced expenditures of the ground munitions cited in this memorandum were due to the stringent application of ASRs because of inadequate stocks in theater to support stated requirements. Within 3 months of the issuance of this memorandum, sufficient assets had arrived in theater, and expenditures of the noted munitions were well above the forecasts that were questioned.

(17) The same rigid controls on production were applied to air munitions. In a memorandum for the Chairman of the Joint Chiefs of Staff, the Secretary of Defense advised that for planning purposes, the approved production level of air munitions was that at which it should level off in January 1967, with a capability to expand to 140 percent of that level should the operational situation require expanded production.³³ This guidance was expanded and passed from the Directorate of Air Munitions to the Service Secretaries in a memorandum which stated that air munitions budgets would be submitted in terms of this given level of monthly production objective through 30 June 1968. It further advised that after 30 June 1968, requirements would be submitted in terms of either a continuing at that level or a reduction to a single shift basis through production lead time.³⁴ The constraints this imposed on the Services and the perturbations it created in production scheduling are evident when it is observed that production of air munitions actually rose 20 percent over the specified production base capacity by June 1968.³⁵

(18) The difficulties of accommodating surge expenditures is demonstrated by the case of naval gun ammunition. In May 1967, to support an increase in consumption, the Ground Munitions Directorate authorized an increase in naval gun ammunition production from 1,700 tons per month to 4,000 tons per month. In September it was directed that production be leveled at 2,800 tons per month—a quantity approximately equal to monthly consumption. The Tet Offensive in February 1968 resulted in a sharp increase in expenditure, with consumption in March totaling 4,513 tons. It was not until August 1968 that an increase in production had been justified and authorized to support the continued high combat consumption rates.³⁶

c. Controls by the Joint Chiefs of Staff. The Joint Chiefs of Staff were also to exercise significant controls over munitions logistics. The "push" distribution system instituted in April 1966 by the Secretary of Defense was by late 1966 creating excesses of some items. In compliance with CINCPAC requests, various controlled munitions were removed from the "push" system in late 1966.³⁷ This action, however, elicited a response from the Secretary of Defense, who stated that stocks of all remaining air munitions items on the controlled list in CONUS depots, other than those set aside for CINCLANT, should be earmarked as a "Joint Chiefs of Staff Reserve," and that munitions from this Reserve would be released as approved by the Assistant Secretary of Defense (I&L) upon the Joint Chiefs of Staff request.³⁸ In their implementing instructions to the Services, the Joint Chiefs of Staff directed that all controlled air munitions not required for SE Asian support or training, or set aside for CINCLANT, would be stored in CONUS depots and earmarked as a "Joint Chiefs of Staff Reserve." This Reserve was to be

³²Secretary of Defense, Memorandum for the Service Secretaries, subject: Procurement of Combat Consumables for Southeast Asia Operations (U), 15 January 1966 (SECRET).

³³Secretary of Defense, Memorandum for the Chairman of the Joint Chiefs of Staff, subject: Air Munitions Plan for Southeast Asia (U), 20 June 1966 (SECRET).

³⁴Special Assistant to the Assistant Secretary of Defense (I&L), Memorandum for the Service Secretaries, subject: Air Munitions Budgets for FY 1967 and FY 1968 (U), 21 October 1966 (CONFIDENTIAL).

³⁵DDO, Air Munitions Directorate, Fact Sheet, Air Munitions Production (Tons) (U), 31 July 1969 (SECRET).

³⁶DDO, Directorate of Ground Munitions, Fact Sheet, Ground Munitions, undated.

³⁷Joint Chiefs of Staff, Messages 151422Z November 1966 and 302040Z November 1966.

³⁸Secretary of Defense, Memorandum for the Chairman of the Joint Chiefs of Staff, subject: Controlled Air Munitions, 20 January 1967.

AMMUNITION

drawn on only for "purposes as directed in each instance by the Joint Chiefs of Staff, subsequent to approval by the Assistant Secretary of Defense (I&L)."³⁹ This policy precluded the individual Services from making munitions diversions or allocating assets to fill other worldwide war reserve requirements without approval of the Department of Defense. Specific examples of the problems presented and the delays incurred in reconstitution of Atlantic Fleet reserves and buildup of Northeast Asia stockage are presented in Appendixes E and G.

d. Controls by CINCPAC

(1) The allocation controls exercised by CINCPAC extended beyond the establishment of monthly authorizations of controlled air munitions to the component Services, as has been discussed. The CINCPAC also established a maximum level of supply—the maximum stock of air munitions to be on hand at any one time—equal to 90 days of supply at the allocated rate. A Requisitioning Objective, defined as the maximum quantities of materiel to be maintained on hand and in the pipeline, was established as equal to 135 days at the allocated rate, based on a desired on-hand level of 45 days plus a 90 day shipping pipeline.⁴⁰

(2) The establishment of maximum levels and pipeline as a simplistic multiple of allocations was to create problems with a number of ammunition items. For example, at one point in time the allocation to Seventh Fleet of MK 24 parachute flares, an item that experienced wide fluctuations in usage rates, was 3,000 per month, which established a maximum level of supply of 9,000 flares. Shipfill and load list quantities required for combatant and support ships, however, totaled 11,000. Therefore, there were insufficient assets authorized to fill the ships, much less provide for stocks ashore for resupply. The same problem existed within Seventh Fleet for other ammunition items in limited use.⁴¹ The Air Force was able to circumvent this problem through the vehicle of the PACAF Ammunition Planning and Programming Guide in which exceptions to the 90-day maximum supply levels were requested for low-use items and CINCPAC approval obtained.⁴²

(3) The control of pipeline quantities as a function of days of ammunition allocated served to preclude build up of reserve stocks within the allowable stockage level. Reduced allocations, frequently only a reflection of lowered expenditures due to temporary lulls in the tempo of combat, resulted in automatic reductions in authorized pipeline quantities. Subsequent surges in expenditure as enemy activity increased would then result in serious depletions of assets until allocations and then the pipeline quantities were increased.

e. Summary. The Vietnam era was marked by major shifts in the control of ammunition programs from the Services to the Office of the Secretary of Defense, the Joint Chiefs of Staff and the unified commander. The Air Munitions Directorate of the Department of Defense became responsible for almost all aspects of the management of air munitions, from validation of requirements to the approval of monthly production schedules. Strict production controls were adopted in the case of ship gun munitions. The Ground Munitions Directorate, however, relied on the Military Services Ammunition Allocation Board (MSAAB) to allocate and control the distribution of ground munitions and limited its actions to approval of procurement and production programs. A policy was directed by the Secretary of Defense whereby quantities of selected air munitions which were produced but not immediately required by SE Asia combat forces were placed in the Joint Chiefs of Staff Reserve. These items could not be utilized by the Services to fill worldwide requirements without approval of the Department of Defense. CINCPAC, in addition to allocating most air munitions, established firm policies on maximum stock levels and pipeline quantities.

5. AMMUNITION REPORTING SYSTEMS

a. General. The creation of the Directorate of Air Munitions and the Directorate of Ground Munitions at Department of Defense level resulted in an associated increase in management and

³⁹Joint Chiefs of Staff, Message 4412/241745Z January 1967.

⁴⁰PACOM, Air Munitions Allocations documents, issued monthly (SECRET).

⁴¹COMSERVPAC, Briefing to the Joint Logistics Review Board Ammunition Team, 30 July 1969.

⁴²PACAF Ammunition Planning and Programming Guide, October 1968, p. 66, and previous editions.

AMMUNITION

control of ammunition logistic matters at the highest levels within the individual Services. An element responsible for munitions matters was formed by each Service within the office of their respective Assistant Secretaries for Installations and Logistics. These groups were responsible for implementing the directives of the Munitions Directorates, and served as channels between the operating forces of the Services and the directorates. Further, each Service greatly expanded its munitions staff at the deputy chief of staff level, to create an effective interface with the secretarial organizations. These factors resulted in a significant migration of management authority away from the Service organizations charged with ultimate procurement and distribution. The concentration of ammunition management responsibility at the highest levels resulted in unprecedented demands for logistic data that were timely, accurate, responsive, and reduced to forms amenable to the formulation of management decisions. To obtain an appreciation for the problems this imposed, it is necessary to briefly review the reports required by the higher echelons of management. The Department of Defense had directed implementation of the Selected Item Status Report (SISR) in August 1965, under the Report Control Symbol (RCS) DDI&L (M) 682, to provide management data on selected worldwide air munitions items. The format and content of the SISR and the feeder data requirements were revised in July 1966 with a new RCS of DDI&L (M) 731, revised again in November 1966 to the DDI&L (M) 6647, again in July 1967 to the DDI&L (M) 778 and finally in September 1968 to the DDI&L (M) 902. In July 1966, the Joint Chiefs of Staff directed the unified commands to furnish them with still another report, initially at 10-day intervals, but later semimonthly. The scope and depth of information required for these reports could not be consistently provided by the Services in early 1965, as their peacetime ammunition reporting systems were ill-suited to handle the magnitude of these demands placed on them. As it was only through use of service-furnished data that the Department of Defense Munitions Directorates were able to exert management control, the evolution of each Service's information system will be traced.

b. Army. The Army, in April of 1965, had recognized that the then existent ammunition reporting system was not sufficiently responsive for modern management requirements, and had instituted actions to implement a completely new system. This new system, the World-Wide Ammunition Reporting System (WARS), but also commonly referred to by its report control symbol number as the 1322, was first implemented in September 1965. In its initial stages, the WARS report was manually prepared at the Army Inventory Control Point from teletype feeder reports submitted by operating commands. The manual version was published monthly for each of 150 to 250 critical ammunition items, and, for each, included 11 elements of information. A major improvement was made in timeliness, with reports being distributed within 60 days of input cut-off, whereas the previous system had averaged 120 days. After several modifications to improve data element definition and format, the WARS was not only expanded to include all ammunition items but also fully automated in September 1967. This made possible an even greater improvement in timeliness, reducing data age to only 15 days. The WARS had been designed to allow for expansion and improvement, as evidenced by the conversion from manual to computer processing. This inherent feature has enabled further expansion of the basic requirements and asset system to include maintenance and readiness assessment reports, with further developments projected for the future.⁴³

c. Navy

(1) The Navy also experienced significant problems in meeting the demands for ammunition inventory information. At the onset of the Vietnam conflict, fleet units submitted weekly consumption reports, which COMSERVPAC utilized to maintain a fleet-wide asset file, using punch card accounting machines. A detailed program for acquisition of more adequate automated data processing equipment and program development to provide for the management and information needs of the fleet and higher authorities was placed into effect in August 1965. Following a request by the Secretary of Defense for daily reports, demands for information increased to the point that daily Critical Air Strike Ordnance Reports to CINCPACFLT and CINCPAC were commenced in April, 1966. In addition, special weekly reports in more detail were provided the Chief of Naval Operations to supply information to the Secretary of the Navy. These

⁴³U.S. Army Munitions Command, The World-Wide Ammunition Reporting System (WARS), June 1969.

AMMUNITION

in turn placed a requirement for daily reports to COMSERVPAC from ships, units and activities concerned with such ordnance—and a requirement for COMSERVPAC to consolidate and verify these each day.

(2) In August 1965, Commander Service Force, Pacific had been receiving monthly ammunition reports for fleet issue ammunition from about 54 Pacific activities. Ship Parts Control Center, Mechanicsburg, received quarterly asset and expenditure reports from all Pacific activities. The expenditure and most of the asset information was untimely, often as much as 4 months old. Many command levels, unable to meet their requirements with this type of information, were imposing requirements for additional ammunition reports on their activities and units.

(3) A series of steps were required throughout the year to improve the system and meet expanding needs. Recognizing the need for a uniform reporting system timely enough to provide workable data, COMSERVPAC promulgated new Pacific Fleet ammunition reporting procedures after the Chief of Naval Operations directed monthly ammunition reporting. This report provided data by mail, timely enough to be of great value to Fleet and Navy logistic managers.

(4) With ammunition becoming more and more critical, and queries by Western Pacific (WESTPAC) commanders and higher authority becoming more frequent and demanding more information, a new system of reporting shipping information to Commander Service Force, Pacific, had to be initiated. New formats were developed, and in September COMSERVPAC commenced receiving detailed weekly shipping schedules for NAD, Bangor, and NWS, Concord. In addition, COMSERVPAC requested information copies of all Department of Defense Cargo Traffic Messages be provided for ships leaving Concord and Bangor. These messages provided final tonnages by Service, and the final movement schedule. Naval Ammunition Depot, Bangor, and Naval Weapons Station, Concord, were directed to airmail (special handling) all manifests for ammunition ships leaving their activities. Copies of existing deployment location messages were also requested and provided, enabling COMSERVPAC to monitor the underway progress of most of the ammunition ships.⁴⁴

(5) The increasing importance placed on the accounting of ammunition from production to receipt generated a requirement for a means of acquiring such information without a large additional burden imposed on already overtaxed WESTPAC ordnance activities. To satisfy these requirements, an ammunition shipment or receipt report was devised. As a result it became possible for COMSERVPAC to follow all Navy ammunition moving for the Pacific theater, from the time it was shipped from the production facility to its receipt at the final destination, with ships' positions being monitored across the Pacific.⁴⁵

(6) In July 1966, a new air munitions reporting system required by CINCPAC and the Joint Chiefs of Staff was implemented. The Pacific Fleet was able to support the new requirement despite a delicate conversion of inventory control systems to computer processing, in progress when the requirement was levied. The total flow of ammunition asset information is illustrated in Figure 10.⁴⁶

(7) In May 1967, the Joint Chiefs of Staff Reporting System for Southeast Asia and the Pacific was extended worldwide, and in essence required dual reporting because of irreconcilable conflict with the Navy system, due to the expenditure reporting methodology involved. At the request of COMSERVPAC, the Chief of Naval Operations convened a conference in August 1967, which initiated changes in the Navy system to end this duplication and conflict. Pacific Fleet proposals were adopted virtually intact, and had superseded existing systems in the Pacific by the end of the year. The benefits of this single system were almost immediately apparent, e.g., (a) inventory inconsistencies disappeared, (b) end item and component data agreed, (c)

⁴⁴COMSERVPAC, U.S. Pacific Fleet, Operations of the Service Force, FY 66 (CONFIDENTIAL).

⁴⁵Ibid.

⁴⁶U.S. Pacific Fleet, Operations of Service Force, FY 67 (CONFIDENTIAL).

AMMUNITION

component shortages at the unit level became immediately evident, (d) accuracy improved, (e) preparation time was reduced by 50 percent, (f) timeliness improved, (g) communications load was reduced by 50 percent, and (h) better utilization of computer resources was possible. The integrated Navy Information Reporting System was then implemented in the Atlantic Fleet in July 1968, providing these advantages on a worldwide basis.⁴⁷

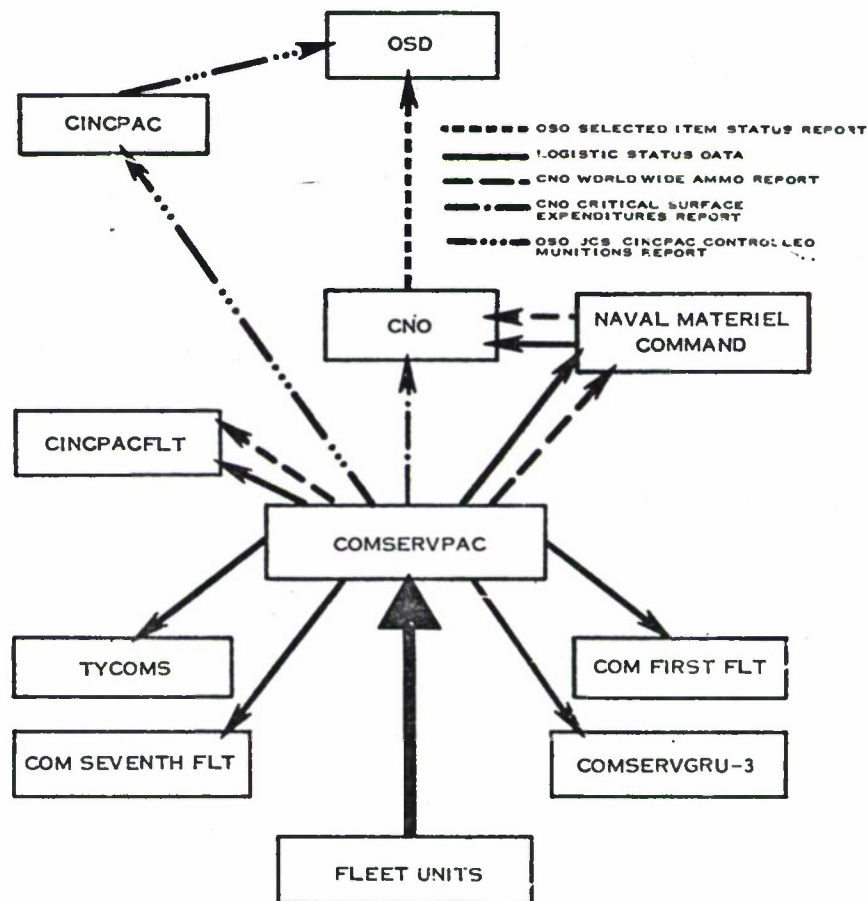


FIGURE 10. NAVY AMMUNITION REPORT INFORMATION FLOW

Source: COMSERVPAC, *Operations of Service Force, U.S. Pacific Fleet, FY 67* (CONFIDENTIAL).

d. Air Force

(1) Air Force ammunition asset reporting in 1965 relied on the HAF S-18 reporting system (nicknamed the S-18), and its products provided by the Ammunition Asset Reporting Subsystem, designated D023A. This system was quick to show itself inadequate for wartime operations. It did not provide for inputs from production, and in-transit quantities were computed positions that could not be audited. Errors introduced into the system were difficult, if not

⁴⁷Comdr. H. Dickson, *Navy Ammunition Information and Control Systems in Pacific, July 1969*.

AMMUNITION

impossible, to purge from the records. Also, SE Asian bases were not included in the system, as munitions were dropped from the inventory when they were shipped forward from the Main Operating Base at Clark AB. To obtain vitally needed asset data, the Pacific Air Forces (PACAF) implemented the Emergency Action Reporting for Logistic Action Programming (EARFLAP) reporting system authorized by Air Force Regulation 67-9. When first used in February of 1965, about 10 or 15 items were reported upon on a weekly basis. It was rapidly expanded, however, to provide daily reports on all air munitions components used in SE Asia. Each base in SE Asia reported to Seventh Air Force by telephone prior to 2400 hours, its munitions receipts, expenditures and balance on-hand as of 1800 hours that day, using secret codes. The same data was also transmitted to PACAF by immediate precedence message. The EARFLAP report remained in existence until 15 June 1969 to serve the needs of Seventh Air Force and PACAF.⁴⁸

(2) The EARFLAP did not, however, serve all the data needs of the Ogden Air Materiel Area, the Air Force Logistics Command, the Air Staff, the Joint Chiefs of Staff, or the Department of Defense. During the critical days in mid-1966, these echelons of command levied reporting requirements on the operating forces to meet their own peculiar needs for data until at one time, Seventh Air Force munition controllers were submitting 14 separate reports.⁴⁹ The underlying problem was a lack of commonality, with each report containing differing data elements, varying cut-off times and inconsistent definitions. When comparisons were made of inherently differing reports, the disparities were frequently taken to be errors—and a new report would be requested to obtain resolution. Typical of these problems was the requirement to report complete rounds in the SISR. An M117 bomb is assembled from 13 different components, and since there are many types of each component, it is possible to derive over 5,000 distinct complete round configurations. Further, most of the components are compatible with other types of bombs. Therefore, limited quantities of fuzes might all be applied to M117 bomb bodies on one report, to MK 82 bomb bodies on another, and to some combination on another, resulting in vastly different asset pictures.

(3) The Air Force efforts to purify reporting operations through a comprehensive special worldwide inventory and to resolve reporting difficulties from Army production agencies and storage sites have already been mentioned. The most significant single action taken, however, was the inception in July 1967 of a new worldwide ammunition reporting system, designed to make the greatest possible use of modern data communications and processing equipment. This system, the Base and Command Standard Reporting System (D078), was placed into use in early 1969. Under D078, each base prepares punch cards on daily transactions, and after machine editing and compiling, transmits this data via AUTODIN to major command level. There, it is consolidated, re-edited and again transmitted by AUTODIN to the Inventory Control Point (ICP). The ICP utilizes this data to assemble the reports required. This system has proven to be timely and accurate, and has greatly enhanced worldwide munitions asset visibility.⁵⁰

e. Summary. From the foregoing exposition of the turmoil in ammunition reporting systems, it must be concluded that each of the individual Services was able to respond to unparalleled demands for munitions logistics data, but only by the application of modern computer technology and related communications systems. The scope of the demands for management information, the depth of detail required, and the immensity of the quantities of munitions to be reported on had not been clearly foreseen, which was to cause some delay in achieving the current automated systems. Further, the number of different reports required, which were frequently repetitive, overlapping and based on differing computational methodologies, created unnecessary workloads and additional delay in the achievement of practical reporting systems.

⁴⁸PACAF, Briefing to Joint Logistics Review Board, Ammunition Study Group, 6 August 1969 (SECRET).

⁴⁹*Ibid.*

⁵⁰Hq, USAF (AFSSS), Letter, subject: Munitions Logistics During the Vietnam Conflict 1965-1968, 16 September 1969.

6. CONCLUSIONS AND RECOMMENDATIONS

a. Conclusions

(1) The ammunition stockage authorization of Logistics Guidance, based on specific force levels and combat durations, did not adequately provide for the needs of the strategy of gradualism pursued in Vietnam (paragraph 2a).

(2) Limitations placed on production because of concern over the possibilities of excess at the end of the Vietnam conflict, and the use of assumptions concerning the end of the conflict resulted not only in frequent extraordinary programming actions but also in stocks of many items consistently remaining below worldwide objectives (paragraphs 2a and 2c and Appendix D).

(3) In 1965, only the Army was authorized D-to-P ammunition stocks, but by 1968 support under this concept had been extended to the Indefinite Combat forces of all the Services (paragraphs 2a, 2c, and 3a).

(4) At times budget policies and fiscal constraints caused stated ammunition requirements to be reduced. Subsequent acceptance of these reduced quantities as valid requirements could have resulted in faulty evaluations of the risks involved (paragraph 2c).

(5) The policy of the Department of Defense during the Vietnam era was to gear production of ammunition to be equal to combat and training consumption with little, if any, production allocated to build up War Reserves. Rationale supporting this policy was that the very existence of the hot production lines would, after hostilities ceased in SE Asia, be utilized to fill existing shortages and, therefore, represented a form of war reserve capability (paragraph 2c).

(6) The present methods of requirements determination used by each of the Services are sound for those items that saw extensive use in the Vietnam conflict. They take into account the different roles and modes of operations of the forces involved (paragraphs 3a, 3b, 3c, and 3d).

(7) Ammunition logistic management staffs within the Services and unified commands were inadequate at the start of the Vietnam conflict to permit the commanders concerned to carry out their responsibilities in an effective manner. These responsibilities had little resemblance to peacetime tasks (paragraphs 4a, 4b, and 4c).

(8) Actions taken by Commander in Chief, Pacific, to redistribute ammunition in critical situations proved the soundness of the authority granted the unified commander under Joint Chiefs of Staff Publication 2, Article 30203 (paragraph 4c).

(9) The establishment of a staff organization in the Office of the Secretary of Defense provided a suitable focal point for ammunition matters. Despite the fact that exceptional control was exercised through this office, no formal mission statement or charter was promulgated (paragraph 4a).

(10) The Assistant Secretary of Defense (Installations and Logistics), through the Joint Chiefs of Staff Reserve concept, maintained total authority over allocation and distribution of all excess controlled air munitions. This method of control imposed a constraint on Commander in Chief, Pacific, and Service redistribution of all controlled air munitions, including those no longer in critically short supply (paragraph 4b).

(11) At the start of the Vietnam conflict, neither the Services nor the unified commands had the systems to maintain accurate and timely information on ammunition expenditure rates or asset positions under the dynamic conditions of warfare. This contributed to the migration of control of ammunition programs to higher levels of command (paragraphs 5a, 5b, and 5c).

(12) During the course of the conflict, sound automatic data processing-oriented information systems were developed by each Service to meet its own management and command

AMMUNITION

requirements and to provide for the information needs of higher commands (paragraphs 5a, 5b, and 5c).

b. Recommendations. The Board recommends that:

(1) Ammunition inventory objectives for all the Services be based on the D-to-P concept (AM-5) (conclusions (1), (2), and (3)).

(2) When the Services have established what they consider to be valid requirements for ammunition inventory objectives, care be taken that these continue to be identified as requirements regardless of program and budget decisions (AM-6) (conclusion (4)).

(3) Organizations maintained in the Office of Secretary of Defense for staffing ammunition matters be formally chartered so that division of authorities and responsibilities between the military departments and the Secretary of Defense are clearly defined (AM-7) (conclusion (9)).

(4) Each Service retain the current ammunition information systems that were developed to meet the needs of the Vietnam War. Continue to improve these basic systems to permit timely updating of expenditure rates, meet the command and management needs of the Services and furnish the data requirements of the unified chain of command and the Office of the Secretary of Defense. During peacetime, periodically exercise these systems in simulations of wartime situations (AM-8) (conclusions (11) and (12)).

CHAPTER V
PROCUREMENT AND PRODUCTION
OF MUNITIONS

CHAPTER V

PROCUREMENT AND PRODUCTION OF MUNITIONS

1. GENERAL

a. At the onset of the involvement of U.S. combat forces in SE Asia the worldwide status of ammunition for the four military Services was generally adequate insofar as respective inventory objectives were concerned. These inventory objectives comprised the various pre-positioned War Reserves and those War Reserves held in the continental United States (CONUS). However, as indicated in Chapter IV, the Services did not have on hand those mobilization stocks of munitions referred to as D-to-P stocks (assets to sustain operations until production equals or exceeds consumption). This inadequacy of mobilization assets to fight a sustained war beyond the limit provided by War Reserves was further degraded by (1) subsequent introduction of new weapons systems for which munitions in quantity had not been procured, (2) the age and physical condition of the assets on hand, (3) the incapability of the production base to respond within the time provided by the assets on hand, and (4) the peacetime constraints affecting the procurement and production of munitions to meet wartime demands.

b. The response of the production base as it developed to meet the demands emanating from the buildup in SE Asia is reviewed in this chapter. This response is reviewed in terms of the policy, organization, and functions of the munitions-procuring Services and in the areas of procurement, production, and single Service management of munitions items. Problems that developed in these areas as they impacted on the response of the production base will be highlighted.

c. The status of specific munitions items selected for detailed review are contained in Appendix D to this monograph. This detailed review includes an analysis of consumption, production, and asset status during the period 1 January 1965 through 30 June 1969. The data contained therein are utilized as appropriate in this chapter to the extent necessary in the development of certain issues.

2. PROCUREMENT POLICY, ORGANIZATION, AND FUNCTIONS OF THE SERVICES

a. Policy

(1) The procurement of munitions by and for the four military Services is for the most part accomplished by the Army and the Navy and to a limited degree by the Air Force. The Marine Corps obtains all their munitions from the Army and the Navy through Military Interdepartmental Procurement Requests (MIPR).

(2) Policies and procedures governing munitions procurement as of 1 January 1965 were relatively straightforward in each of the munitions-procuring Services. Procurement of munitions metal parts by the three procuring Services was nominally effected on a formally advertised basis with private industry. In those instances where there was a need for negotiating contracts for technical or specialized supplies requiring substantial initial investment or extended periods of preparation for manufacture, negotiation authority was provided from the secretarial level. This authority was predicated on provisions of USC 2304(a) (14). In this era it was generally recognized and accepted that the manufacture of munitions metal parts required large investments of capital in production equipment and substantial production lead time. The load, assemble, and pack of munitions was essentially accomplished by the Army and Navy in Government owned-contractor operated (GOCO) and Government owned-government operated (GOGO) plants, respectively. The operation of the Army GOCO plants was contracted for by negotiation whereas the Navy's GOGO plants were operated by Navy civilian personnel authorized under the annual Navy budget. The Air Force had no in-house munitions production

AMMUNITION

capability, but it procured metal parts for some munitions items from private enterprise and furnished these metal parts to the Army or Navy for load, assemble, and pack. The remainder of the Air Force munitions was obtained by MIPR from the Army or Navy.

(3) Prior to 1 January 1965, all the Services except the Marine Corps had undergone a significant change in their respective logistic structure. As was true for the Army, this change, resulting from Department of Defense Project 60, saw the phasing out of the Army Materiel Command's (AMC) procurement district network. This district network had provided the major portion of the munitions Procuring and Administrative Contracting Officer capability. With the phaseout of the districts and the establishment of the Defense Contract Administration Service (DCAS), the trained personnel gravitated to the newly established DCAS offices. The impact of this loss was not fully realized until the increased procurement workload in support of SE Asia developed. Although this loss was later mitigated, to an extent, by the retention of five of these procurement districts to offset the overall loss and to complement the Army commands in performance of their procurement missions, this loss has never been fully recouped. The Navy was also considerably affected by this policy. In the case of the Air Force, the change relating to the disestablishment of the Air Materiel Command and the formulation of the Air Force Logistics Command (AFLC) had occurred in 1962 and the impact of this change was insignificant insofar as any accrued effect on munitions procurement. In essence, the shortage of trained procurement personnel in the munitions field was not influenced by this USAF reorganization.

(4) The Navy also underwent a significant change in its logistic organization; however, this change which disestablished the Bureau of Naval Weapons and formulated the Naval Air Systems Command (NAVAIRSYSCOM) and the Naval Ordnance Systems Command (NAVORDSYSCOM) did not occur until 1966. This change was of little significance insofar as having an impact on the shortage of trained munitions procurement personnel. However, it did complicate the situation in that the management channels increased from one to two.

b. Organization, Functions, and Controls. The organization, functions, and controls, as relates to the procurement of munitions, differ to a certain extent among the three munitions-procuring Services. These differences are reviewed in Appendix D.

3. SIGNIFICANT PROCUREMENT PROBLEMS

a. General. With the advent of the buildup in SE Asia, munitions procurement increased significantly in all Services, as evidenced by the data displayed in Table 5. These increases in procurement placed considerable strain on the munitions procurement agencies of the military departments that were operating at the onset at peacetime personnel levels and under peacetime constraints. The required resources were not mobilized, as in previous wars, to overcome the problems posed by the increased munitions procurement activity. Although sufficient flexibility was provided in the Armed Services Procurement Regulations to allow timely contract placement through negotiation, there was a tendency to tighten rather than relax precontract administrative controls. This anomaly was heightened by the emphasis at the highest levels of Government on obtaining maximum competition through the means of formal advertisement, or alternatively if negotiated procurements were utilized, competition was required. This tightening of controls, coupled with the emphasis on competition, created a serious obstacle to the timely execution of contracts. The timely execution of contracts was further inhibited by lack of interest by private enterprise, shortages in trained procurement personnel, dependency on foreign sources for certain munitions components, time required for processing Secretarial Determination and Findings, cancellation of administrative lead time, fluctuation of requirements, and limited capability of the production base. Each of these factors will be discussed and conclusions and recommendations derived.

b. Tightening of Controls

(1) Considering the impact of the large expenditures for munitions on the national economy and to ensure that the procurement actions were properly executed with maximum competition, the Secretary of Defense promulgated a directive in July 1965 pertinent to the shift from competitive to noncompetitive procurements. Essentially this directive required a

AMMUNITION

for all contracts awarded in support of SE Asia operations if the basis of procurement was shifted from competitive to noncompetitive. This directive required before the fact Service secretarial approval for awards over \$1 million and Assistant Secretary of Defense (I&L) approval for awards in excess of \$10 million.¹ If the exigency was such that extraordinary procurement actions were utilized to ensure continuity of production, then after-the-fact review and notation was required. Considering the fact that in the absence of adequate administrative lead time it was in the best interest of the Government to procure certain items in this sole source manner, a listing of items exempted from this procedure was promulgated in 1966.² When a munitions procurement for a given item was effected, the winning contractor, normally a planned mobilization producer, required certain Government-furnished equipment, had incurred some sunk costs, and in the process had proceeded through the manufacturing learning curve. Assuming that he was a successful contractor—produced at an acceptable cost, met his production schedules, and conformed to the myriad of requirements imposed on a Government contractor—there are substantial advantages to placing additional follow-on procurement for this item with the same contractor. This is particularly true in the case of ammunition in war when uninterrupted production is required to sustain the pipeline. Time often was not available to explore possible costs savings through formal advertisement, or at times even to seek competition through negotiation, to obtain a presumably better price from another contractor. The costs in time and money, coupled with the impact of the break in production of metal parts on the load, assemble and pack operation need to be weighed against the associated risk of interrupting the supply of munitions to the combat forces.

TABLE 5

MUNITIONS PROGRAMS, FISCAL YEARS 1965 to 1969, ALL SERVICES
(In Millions of Dollars)

FY	Army ¹	Navy ²	Marine Corps ³	Air Force ⁴
1965	305.7	430.2	34.5	289.0
1966	1,288.1	751.2	416.7	1,174.1
1967	1,253.2	673.5	206.9	1,155.6
1968	2,290.7	690.9	482.2	1,519.2
1969	2,913.0	760.5	416.9	1,721.6

Sources: ¹Department of Army, Memorandum, subject: Ammunition Logistics in Support of SE Asia Operations, 1965-1968, 5 September 1969.

²NAVAIRSYSCOM NAVORDSYSCOM Budget Submissions.

³Department of Army, DCSLOG Memorandum, subject: Ammunition Logistics in Support of SEA Operations 1965-1968, 5 September 1969.

⁴HQ, USAF (AFSSS), Letter, subject: Munitions Logistics During the Vietnam Conflict, 1965-1968, 16 September 1969.

(2) In 1969, in recognition of the fact that the buildup had been accomplished and the above control had been established during a period of increasing procurement activity and was based on concern that the exigencies of this activity tended unnecessarily to cause a shift from competitive to noncompetitive procurement, this control was rescinded. This rescission was accompanied by an accentuation of the need for continued emphasis on competitive procurement.³

¹Office of Secretary of Defense, Memorandum for the Secretaries of the Military Departments and the Director, Defense Supply Agency, subject: Procurement in Support of SE Asia, 20 July 1965.

²Office of the Secretary of Defense, Memorandum for Secretaries of the Military Departments and Director, Defense Supply Agency, subject: Sole Source Procurement Approval, 16 December 1966.

³Secretary of Defense, Memorandum for Secretaries of the Military Departments and Director, Defense Supply Agency, subject: Procurement in Support of Southeast Asia, 23 October 1969.

AMMUNITION

c. Response of Private Industry. The established mobilization plans included the provision for production of munitions metal parts by planned mobilization producers in private industry. In response to the munitions requirements generated from the buildup in SE Asia the necessity for rapid acceleration of munitions production developed almost overnight. In the absence of a Presidential Proclamation calling for mobilization of national resources these planned producers were in no way obligated to respond to the needs of the Department of Defense. In general there was lack of interest on the part of private industry which was fully preoccupied with meeting the requirements of a booming civilian economy.⁴

d. Administrative Lead Time. Historically, the decisions pertinent to the production of munitions metal parts have culminated in situations whereby contract delivery schedules run out in November of a given year. To maintain continuity of production, thus avoiding shutdown and startup costs, follow-on procurement should be placed in July-August time frame. However, since funds are not normally available until the July-August time frame, the munitions program is not released in total at that time, and munitions items must be broken out by component for procurement, the time available precluded the letting of all the necessary contracts in a manner designed to ensure the best interests of the Government were pursued. Experience indicated that a minimum of 6 months administrative lead time was required to accomplish quality procurement, and a minimum of 3 months was essential for reorder lead time. To circumvent this lack of adequate lead time shortcuts were taken in the form of letter contracts, utilization of option clauses, and noncompetitive procurements; or, alternatively, production schedules were extended to retain continuity of production and bridge the delay.⁵ These shortcuts and alternatives were costly to the Government.

e. Inadequacy of Qualified Procurement Personnel. As indicated earlier, the Army was significantly affected by a shortage of trained procurement personnel, which accrued in part from a major reorganization and in part from the inordinate increase in the volume of munitions procurement in support of SE Asia conflict.⁶ The Navy and Air Force on the other hand were relatively better staffed or had a reservoir of trained procurement personnel on which to draw. The growth of munitions procurement personnel (contract officers and industrial specialists) as compared to the growth of munitions procurement is reflected in Table 6. Although no direct conclusions can be drawn from this comparison, owing to the variation in procurement functions, it is significant to note that the availability of procurement personnel did not keep abreast of the program increases. It is also significant to note that during this growth period there was a continuous attrition of procurement personnel. The impact of this attrition is quantified for procurement personnel in general for the year 1967 as follows: The losses Government-wide in contracting personnel totaled 10.7 percent and in industrial specialists totaled 11.9 percent.⁷ The impact of these losses and the age structure of available procurement personnel, as depicted in Table 7, are certain to adversely affect the adequacy of munitions procurement personnel in the future. This effect is largely attributable to the fact that cutbacks in the procurement of munitions will result in a concomitant reduction in personnel. Such a reduction, enacted in consonance with Civil Service Regulations, will result in the loss of the younger employees who lack sufficient seniority to survive these budget-imposed personnel cuts.⁸

⁴Department of Army, DCSLOG Memorandum, subject: Ammunition Logistics in Support of SEA Operations, 1965-1968, 5 September 1969; Ships Parts Control Center, Briefing for Joint Logistics Review Board, 25 September 1969.

⁵Ibid.

⁶Department of Army, DCSLOG Memorandum, subject: Ammunition Logistics in Support of SEA Operations, 1965-1968, 5 September 1969.

⁷Office of the Secretary of Defense, Report of the Long Range Logistics Manpower Policy Board, February 1969, p. 50.

⁸Department of Army, DCSLOG Memorandum, subject: Ammunition Logistics in Support of SEA Operations, 1965-1968, 5 September 1969; Ships Parts Control Center, Briefing for Joint Logistics Review Board, 25 September 1969.

AMMUNITION

TABLE 6

COMPARISON OF GROWTH OF FISCAL YEAR MUNITIONS PROCUREMENTS AND PROCUREMENT STAFF (In Millions of Dollars and Number of Personnel)

FY	Army ¹		Navy ²		Air Force	
	Procurement	Staff	Procurement	Staff	Procurement	Staff
1965	752.0	167	533.1	19	89.6	— ³
1966	3,031.0	203	1,095.8	25	273.1	33
1967	3,231.4	267	853.5	32	395.6	34
1968	4,655.9	276	1,104.9	36	303.0	33
1969	4,738.9	286	1,140.5	39	464.5	33

¹Includes occupational specialties: 1101-General Business; 1102-Contract-Procurement; 1150-Industrial Specialist.

²Includes Military Interdepartmental Procurement Requests from Marine Corps and Air Force.

³Not available.

TABLE 7

AGE DISTRIBUTION-PROCUREMENT FUNCTION (Percentage of Total Employment)

Age in years	Army	Navy	Air Force
Under 30	5.0	6.7	7.4
30-44	32.6	32.3	33.8
45 and above	62.4	61.0	58.8
55 and above	20.0	17.3	16.9

Source: Office of the Secretary of Defense, Report of the Long Range Logistics Manpower Policy Board, February 1969, p. 53.

f. Processing of Secretarial Determination and Findings

(1) As indicated earlier the secretaries of the military departments are by statute required to make a finding of fact and determine the authority to be appropriate, in those instances, where required, for procurement effected by negotiation rather than formal advertisement. Specifically, this secretarial determination is required when Exceptions 14 and 16 to the 10 USC, 2304(a) are used, but is not required when Exception 2 is used. Although there are 17 negotiation exceptions provided by 10 U.S. Code 2304 (a) (1-17) only Exceptions 2, 14 and 16 are essentially relevant to procurement of production quantities of munitions. These three exceptions are synopsised as follows:

(a) 10 U.S. Code 2304(a)(2): Purchases and contracts may be negotiated if

"the public exigency will not permit the delay incident to advertising."

Every contract negotiated under this authority requires a determination and finding, justifying its use, signed by the Contracting Officer.

AMMUNITION

(b) 10 U.S. Code 2304(a)(14): Purchases and contracts may be negotiated if

"for technical or special reasons he [the Secretary] determines to require a substantial initial investment or an extended period of preparation for manufacture and for which he determines that formal advertising would be likely to result in additional cost to the Government by reason of duplication of investment or would result in duplication of necessary preparation which would unduly delay the procurement of the property."

Every contract negotiated under this authority requires a determination and finding signed by the appropriate Service Secretary or Assistant Secretary (I&L) prior to initiation of procurement action.

(c) 10 U.S. Code 2304(a)(16): Purchases and contracts may be negotiated if

"he [the Secretary] determines that (A) it is in the interest of national defense to have a plant, mine, or other facility, or a producer, manufacturer, or other supplier, available for furnishing property or services in case of a national emergency; or (B) the interest of industrial mobilization in case of such an emergency, or the interest of national defense in maintaining active engineering, research, and development, would otherwise be subserved."

Every contract negotiated under this authority requires a determination and finding signed by the appropriate Service Secretary prior to initiation of procurement action.⁹

(2) Out of consideration of the time required to prepare a Secretarial Determination and Finding, coupled with the number of instances where it is required, the process is normally simplified to the extent possible by an omnibus action in which all the intended negotiated procurement actions within a similar category are consolidated into a Class Determination and Finding (Class D&F). The process of preparing and obtaining Secretarial approval of a Class D&F encroaches significantly on the time available to a procurement activity to place quality procurements during a period of accelerated activations of the munitions production base.¹⁰

(3) To circumvent the delays stemming from the use of Exception 16, all the Services initially utilized Exception 2 to place negotiated munitions procurements in 1965 and continued for the most part through 1966. The Air Force has, with minor exceptions, continued to utilize Exception 2 as the basis for negotiated munitions procurements. The rationale for continuation of Exception 2 by the Air Force is essentially attributed to the fact that since the Air Force has no mobilization base per se for munitions, Exception 16 does not apply; hence, Exception 2 is more appropriate. On the other hand, both the Army and the Navy had an established mobilization production base and this base was activated insofar as possible. From the legal standpoint the appropriate negotiation authority is Exception 16 in this case, and both the Army and the Navy made the transition in 1967. It is apparent that neither the Army nor the Navy were inhibited by the constraint of obtaining secretarial approval of Class D&Fs through the use of Exception 16 at the onset of the Vietnam conflict because the use of Exception 2 prevailed. However, the constraint now prevails and although the legality of the use of Exception 2 may be at issue, the fact remains that its use provided the means for the timely placement of negotiated procurements during a period when time would not permit using the more legally acceptable Exception 16. Out of consideration of the application of Exception 16 the Services should be prepared in future conflicts to use Exception 16 for the placement of munitions procurements.

(4) An additional problem associated with the use of Exception 16 is the annual requirement for submission of a complete Class D&F for the ensuing year procurements. Even

⁹ Armed Services Procurement Regulations, sec. III, part 2.

¹⁰ Department of Army, DCSLOG Memorandum, subject: Ammunition Logistics in Support of SEA Operations, 1965-1968, 5 September 1969: Ships Parts Control Center, Briefing for Joint Logistics Review Board, 25 September 1969.

AMMUNITION

though this D&F is submitted well in advance of the implementation of the fiscal year procurement actions, the fact remains that for the most part, ensuing year procurements will be placed nominally with the same producers of a given item making up the production base. Significant man-hours are required in the development and processing for approval of a Class D&F regardless of when it is accomplished.

g. Fluctuations in Requirements for Production

(1) The determination of requirements as set forth in Chapter IV impacts significantly on the procurement of munitions. This significance is attributed to the fact that, although advance procurement plans are prepared by the munitions procurement agencies of the procuring Services and approved and noted through the respective chains of command, these plans have rarely coincided with the actual released procurement directives. This situation has prevailed each year during the Vietnam conflict and is attributable to (a) the piecemeal deployment of U.S. forces to SE Asia, (b) the Department of Defense policy of controlling and adjusting production to ensure that production did not exceed SE Asia requirements, and (c) the process of budgeting for the conflict to end each fiscal year through FY 67. The purpose of this policy was to preclude the accrual of excess stocks at the termination of hostilities in SE Asia. The pursuit of this policy consistently resulted in changes in the quantities both prior and subsequent to release of solicitations, and in some instances changes were received subsequent to the actual placement of contracts.¹¹ Even though these changes may seem insignificant on the surface, in reality they had a severe impact in many respects.

(2) This policy inhibited, to a degree, the effort to place applicable procurements on a formally advertised basis thus denying any savings that might accrue therefrom. No effort had been made to quantify these savings although, conceptually, savings are inherent in the process.

(3) This policy resulted in the devotion of extra time in the adjustment of quantities in the solicitations and publishing amendments thereto during the crucial time frame, referred to as administrative lead time, when contract placement effort was already taxed to maximum in the munitions procuring agencies.

(4) This policy forced the munitions procuring agencies into utilization of letter contracts, option clauses, and in general caused the already overtaxed agencies to award less than quality procurements.¹²

(5) Analysis of the charts contained in Appendix D provides visibility of the fluctuation of SE Asia consumption. With the exception of those items intensively managed by extraordinary procedures, such as principal air munitions and the high dollar value-high consumption items, such as 105mm howitzer ammunition, it is apparent that the matching of production to requirements was not achieved. It should be noted that the success achieved in those intensively managed items is attributed to the fact that expenditures were intensively controlled. Thus an environment existed in which each of the factors—production, pipeline, and expenditures—were controlled; hence, the total environment was stabilized and under control. However when expenditures were not controlled, thus allowing freedom of action to the combat commander to utilize those munitions resources which provided optimum results in a given engagement, then an environment existed that was not in control. Typical examples of total environmental control are reflected in Figures D-1 and D-2 in Appendix D; the MK 82 500-pound bomb and the M117 750-pound bomb, respectively. Analysis of these charts reveals that once total environmental control was achieved in mid-1966, worldwide consumption, consisting of stringent allocations to training and SE Asia expenditures, closely approximated month by month the actual production of these items. Total environmental control in the area of air munitions was possible because

¹¹ Department of Army, DCSLOG Memorandum, subject: Ammunition Logistics in Support of SEA Operations, 1965-1968, 5 September 1969; Ships Parts Control Center, Briefing for Joint Logistics Review Board, 25 September 1969.

¹² Ibid.

AMMUNITION

expenditure of air munitions was constrained, either administratively (as in the case of established sortie limitations for B-52 bombers) or by the inherent sortie capability of a given aircraft. The record of sorties programmed versus sorties flown for tactical aircraft during the Vietnam conflict reveals an insignificant deviation.¹³ This deviation is more attributable to sustaining the operational capability of the aircraft rather than those factors such as weather, crew readiness, and availability of munitions.

(6) On the other hand, a typical environment in which total control was not achieved (in that expenditures were not intensively controlled) is reflected in Figure D-9, Appendix D, which portrays the status of the 4.2" high explosive mortar round. Month-by-month correlation of production and consumption is nonexistent. Finite control of expenditures of ground or ship gun munition is impossible, since the commander of the forces involved in an engagement will use the amount of a given munition necessary to influence the outcome of the engagement. This amount varies, depending on the magnitude of the engagement, the type of engagement, the immediate availability of a weapon system, and many other factors such as the style of the commander. This variation results in an overall fluctuation in requirements, which ultimately affects the production schedules.

(7) The foregoing does not argue for total control of all munitions. Conversely, it argues for freedom of action for the commander on the ground to utilize the optimum munition required to influence the course of an engagement, be it an air strike or an artillery fire mission. If freedom of action by the commander is to be achieved, then a constraint other than local consumption must be utilized to determine the quantity of munitions to be procured. The constraint utilized should logically provide for maintaining the established stockage objective for the area of conflict, maintaining an established pipeline to the area, and maintaining the necessary reserves to meet other worldwide commitments. The logical constraint in this instance is the worldwide inventory objective which is a more stabilized level than SE Asia consumption. Since this inventory objective is in most cases considerably higher than the SE Asia consumption level, it provides a safety factor that would offset immediate fluctuations in the consumption of munitions in SE Asia. Conceivably, procuring to this objective could result in an excess of munitions equal to the quantity in the pipeline plus the SE Asia stockage objective upon cessation of the conflict—the antithesis of the prevailing philosophy. However, this excess and the cost thereof must be related to two significant considerations. The first consideration pertains to the risk imposed on the forces engaged in the conflict. Although not quantifiable in a finite sense, the availability of optimum munitions certainly impacts on the success of an engagement and the losses in personnel and equipment in achieving this success. The second consideration pertains to the impact on procurement of munitions. In the procurement of munitions, as well as other commodities, quality procurement actions result in the attainment of those procurement objectives relating to reasonable cost to the Government and deliveries on schedule. Neither of these objectives were achieved in the environment that has existed during the Vietnam era, where fluctuating requirements caused acceleration and stretch-out of production schedules and encroached on procurement lead time.

h. Observation. In future conflicts the Services should program for a calculated reserve stock of ammunition to ensure an input to the munitions pipeline sufficient to meet fluctuating combat demands.

4. MUNITIONS PRODUCTION BASE

a. Background

(1) The munitions production base as it existed at the onset of the Vietnam conflict, made up of both Government and private industry facilities, evolved from the capability developed in World War II and the Korean War. "In the case of World War II, we were fortunate that our allies did the fighting until we, over a three year period, built up a stock of munitions. In Korea, we were again fortunate that leftover stocks from World War II gave us an opportunity to

¹³PACAF, PACAF Air Munitions Planning and Programming Guide, October 1968.

AMMUNITION

begin and buildup munitions manufacture, and that the war did not escalate beyond Korea."¹⁴ The situation was less favorable in the case of the Vietnam conflict for two reasons: (a) reserve stocks were in many cases inadequate to provide the margin of time necessary to build up to the point where production equaled consumption (D-to-P stocks), and (b) the production base was not initially responsive to the requirements that developed. The adequacy of these reserve stocks is treated elsewhere in this monograph; the latter, the responsiveness of the production base, is treated here. Responsiveness is reviewed in terms of organization, controls, and the general condition of the production base.

(2) As indicated earlier, the munitions production base is comprised of Government-owned facilities and private industry producers. Essentially, the Government-owned facilities comprise those elements of the base pertaining to the manufacture of military propellants and explosives and the load, assemble, and pack of the finished item. The private industry portion of the production base is largely comprised of facilities capable of the manufacture of munitions metal parts. However, the private industry sector is utilized to the maximum extent available in the production of small arms munitions and bulk propellant and explosives. The capability of the private industry sector in this regard is of limited potential, since it is geared to the demands of the commercial market for these items. This capability is infinitesimal when compared to military demands. On the other hand, the Government-owned facilities include a minor capability for the manufacture of metal parts. The necessity for this capability will be addressed later. A brief explanation is offered for the necessity of manufacturing propellants and explosives, and the load, assemble, and pack of end items in Government-owned facilities.

(3) Private industry, wholly profit motivated, cannot afford the capital investment necessary to establish and maintain in peacetime the facilities required to meet the wartime demands for propellants, explosives, and load, assemble and pack of munitions. It should be noted that this reluctance on the part of private industry also extends to the investment of capital in plant equipment and tooling peculiar to the manufacture of munitions metal parts. As an example, the Army alone has 374 contractors using various quantities of Government equipment in the manufacturing of munitions metal parts, with an acquisition value of approximately \$840 million.

b. Organization of the Munitions Production Base

(1) Among the four military Services, only the Army and the Navy had established munitions production bases of any magnitude. The Air Force had established a production base for only one munitions item—a Cluster Bomb—prior to 1967. The balance of munitions metal parts procured by the Air Force were, and continue to be, produced either by competitive or sole source procurements from single contractors. The major share of Air Force conventional munitions are obtained from the Army and Navy by MIPR; additionally, all Air Force procured metal parts are loaded, assembled, and packed by the Army and the Navy with two minor exceptions. The Marine Corps obtains 95 percent of its ground munitions by MIPR from the Army and the balance from Navy. Hence, the management of the production base for Air Force and Marine Corps munitions is largely invested in the Army and the Navy.

(2) At the onset of the Vietnam conflict, the Army's in-house munitions production base consisted of 26 wholly GOCO production facilities, 24 of which were oriented toward production of conventional munitions. This represents an original acquisition cost of approximately \$1.7 billion. The Army's private industry sector of the munitions production base consisted of approximately 240 Base Production Units (BPU) assigned to approximately 180 private concerns. Of this base, 12 GOCO plants and 51 BPUs were actively producing munitions on 1 January 1965.

(3) In this same time period, the Navy's in-house munitions production base consisted of eleven GOCO and two GOCO production facilities representing an original acquisition cost of approximately \$706.5 million. The total capability of these 11 GOCO facilities was not involved in just munitions production. However, the cost cited relates as nearly as possible to that portion

¹⁴U.S. Army Munitions Command, Staff Study on Munitions Readiness, 12 April 1965, p. 2.

AMMUNITION

of the facility utilized in munitions production. The private industry sector of the Navy's munitions production base consisted of 20 BPUs assigned to private concerns. Of this base, six GOGO and one GOCO plants as well as 57 private concerns were actively producing munitions or components thereof on 1 January 1965.

c. Controls Pertinent to Development and Maintenance of the Munitions Production Base

(1) Those controls affecting the development, maintenance, expansion, and replacement of the production base are treated in detail in the Procurement and Production Monograph. However, the effects of these controls as they impact on the munitions production base are treated herein.

(2) As a consequence of the national policy, in which the national resources were not mobilized to support the SE Asia conflict, the mobilization agreements with the private industry sector of the production base were invalid. This invalidity stems from the fact that commercial producers were unwilling to voluntarily give up their position in the commercial market to participate in a munitions market, which appeared to have limited potential. This invalidity was heightened by the directed emphasis on maximum competitive procurement, which resulted in the loss of a number of planned producers, or their activation for the production of items other than planned. These actions resulted in significant diversion of the planned base. The impact of this situation was most keenly felt in the area pertinent to relocating the available facilities to contractor's plants willing to accept munitions contracts, to include those obtaining competitive awards. This impact is quantified by an analysis of the Army's private industry sector of their production base. "As of 1968, while 224 production units were actually producing ammunition, 51 remained as the original active group from January 1965, 26 actually reactivated for the item planned and 147 represented newly established base or reconstituted base operated for a different item than planned, or by a different concern than planned."¹⁵ A similar shift occurred within the Navy's private industry sector of the production base. The impact of this physical change in the participants of the private industry sector of the production base gains in significance with the knowledge that most of those participants required Industrial Plant Equipment (IPE) varying from individual pieces to complete lines. The significance of the impact is further heightened by the fact that this equipment is controlled by the Department of Defense, not by the Services, in the form of packages referred to as ASODs. Although the individual Services manage the IPE, within DOD established controls, compliance with these controls and the administrative time involved inhibited to a degree the activation of the production base.

(3) The controls in effect as of January 1965 and still in effect both at DOD level and within the Services, remain stratified to provide for a systematic step by step approval process that is both time consuming and in some respects redundant. It is geared to a peacetime environment and as a result inhibited timely response to the accelerated demands that evolved at the onset of the SE Asia conflict. These demands necessitated expedited reactivation of the production base, transfer and realignment of production equipment, acquisition of new facilities, and rehabilitation of old equipment. The significant problem areas as they impacted on the reactivation of the munitions production base are discussed below.

d. Controls on Activation, Expansion, and Establishment of the Production Base

(1) An inhibiting factor pertinent to DOD controls is that relating to the necessity of obtaining DOD approval for all facilities projects with an estimated cost in excess of \$1 million. Approval was necessary in this instance when reactivation of standby plants and production lines, expansion of existing facilities, and establishment of new facilities were required. The administrative time required to process these project requests was and remains significant and the time required for DOD approval, once submitted, averages 4 to 6 weeks. Pending this approval, actual award of the production contract is held up. This approval authority is retained at the Office of the Secretary of Defense level for the purpose of "... minimizing Government

¹⁵Department of Army, DCSLOG Memorandum, subject: Ammunition Logistics in Support of SE Asia Operations, 1965-1968, 5 September 1969.

AMMUNITION

ownership of industrial facilities insofar as possible in consonance with the need to assure economical defense production, maintenance, and research and development programs."¹⁶ The requirement for this approval is over and above the normal program approval of these facilities projects obtained through the budgetary process. Once the base was activated and in production, additional facilities projects were initiated to expand existing capacity or establish new capacity. Although facilities projects initiated to activate the production base were normally well in excess of \$10 million, a significant portion of those facilities projects initiated to expand existing capacity or establish new capacity were less than \$10 million.

(2) It should be noted that approval authority for facilities projects under a half million dollars is vested in the appropriate major commands of the military departments. Table 8 provides visibility of the number of projects and the dollar value of facilities projects within the Army that exceed a half million dollars. Those facilities projects cited in Table 8 include only those pertinent to improving existing capacity or establishing new capacity. As reflected in this table, DOD approval of projects funded in excess of \$1 million involves 60 percent of the number of projects. If this \$1 million limit were raised to \$5 million, the appropriate Service Secretary would then be able to approve 88 percent of the projects, while still affording the Secretary of Defense control over approximately 62 percent of the total dollar amount involved.

TABLE 8
ARMY MUNITIONS FACILITIES PROJECTS
(Number of Projects and Project Value in Millions of Dollars)

Fiscal Year		\$.5 - 1.0	\$1.0 - 5.0	\$5.0 - 10.0	Over \$10.0	Total
1966	Number of Projects	16	20	2	4	42
	Total Dollar Value	12.5	49.4	11.6	72.4	145.9
1967	Number of Projects	23	33	3	5	64
	Total Dollar Value	16.4	63.8	18.4	136.1	234.7
1968	Number of Projects	38	32	6	3	79
	Total Dollar Value	28.0	70.0	36.8	133.7	268.5
1969	Number of Projects	10	18	2	2	32
	Total Dollar Value	7.3	45.9	13.4	31.6	98.2
Total	Number of Projects	87	103	13	14	217
	Total Dollar Value	64.2	229.1	80.2	373.8	747.3

Source: P-1 Procurement Program Budgets for FY 66, 67, 68, and 69.

e. Layaway Policies

(1) The demonstrated value of Government-owned Industrial Production Equipment (IPE) to the production base, as it responded to the demands imposed by the Vietnam buildup, has highlighted a problem within the Services pertinent to the current policies on layaway of the ASOD packages during peacetime. The availability of this IPE contributed immeasurably to the ability of private industry to participate in the production of munitions. However, the condition of this IPE required that rehabilitation to some degree be accomplished prior to its use by the contractor. Additionally, those Base Production Units layed away in contractor's plants and maintained to some degree of readiness required rehabilitation either initially or subsequent to its reactivation because of its age and condition.¹⁷

¹⁶Department of Defense Directive 4275.5, Industrial Facility Expansion and Replacement, p. 5.

¹⁷APSA, Briefing to Joint Logistics Review Board Ammunition Team, subject: Army Ammunition Production Base, 9 July 1969.

AMMUNITION

(2) Within the Army, the established criteria dictate that no more than 7 percent of the replacement value of the materiel can be used to lay the equipment away; and annual maintenance expenditures, once the equipment is laid away, cannot exceed 1-1/2 to 2-1/2 percent of the replacement value dependent on whether the IPE is, respectively, Government or contractor owned.¹⁸ Within the Navy, there is no established restriction on the amount of funds authorized for layaway or maintenance. In both Services, however, the availability of funds impacts significantly on the degree of maintenance of the equipment. These funds are nominally Operations and Maintenance (O&M) funds.

(3) The amount of funds required hinges on the state of readiness in which the facilities are laid away—either a high state or a low state. Once the desired state of readiness is achieved, then the available funds during subsequent years dictate whether the state of readiness is maintained. Historically, military budgets are reduced subsequent to cessation of any conflict, and competition of priorities for these dwindling resources within each Service has inevitably impacted on maintaining the industrial production base at the desired state of readiness. The optimum time for the necessary rehabilitation and maintenance of IPE is while it is laid away. If this rehabilitation and maintenance is deferred until the time the IPE is needed, then delays in production occur while the deferred effort is accomplished usually on a crash basis at a cost in excess to that for which it could have been accomplished in a layaway mode.

f. Observation. The Services should develop a meaningful, adequately funded program that will ensure that the desired state of readiness of Industrial Plant Equipment is achieved and maintained while the equipment is in layaway.

g. Condition of the Munitions Production Base

(1) The munitions production base prior to World War II was almost nonexistent. However, during the war, it grew into a formidable complex. The Army built from scratch a production base consisting of 112 ordnance and chemical plants at a cost of over \$4 billion. The Navy complex essentially followed the Army growth pattern in that by the end of the war it consisted of 19 plants.

(2) At the onset of the Korean conflict, the Army's munition production base had declined to only 56 plants, 40 of which were eventually activated to support the demands of that war. The Navy production base also declined in a similar pattern and at the onset of the Korean conflict only 16 plants remained, all of which were activated in support of the Korean effort. By 1 January 1965, the Army munitions production base had declined further still, to the extent that only 26 plants remained. These 26 plants, wholly GOCO, comprised 9 explosive plants; 12 load, assemble, and pack plants, and 5 metal parts plants. The Navy munitions production base at the same time consisted of 11 GOCO and 2 GOCO plants. By virtue of their mission assignments, these facilities cannot be categorized individually as explosive; load, assemble, and pack; and metal parts plants, as a single plant may have a diversified mission. Naval Ammunition Depot, Hawthorne, for example, loads, assembles, and packs medium caliber projectiles, mines, and major caliber projectiles; renovates and maintains several types of munitions; operates a test range; and acts as a storage facility, among other functions.

(3) The production base, as it existed on 1 January 1965, both within the Army and the Navy, was obsolete by modern manufacturing standards. The manufacturing processes were antiquated and the equipment, sadly neglected because of the lack of funds for maintaining, required major rehabilitation. Additionally, individual pieces of equipment were missing from layaway production units. Most significant, however, was the fact that no real progress was achieved in modernizing and updating the existing production base.¹⁹

¹⁸Army Regulation 37-40, Army Production Base Support Program Report, p. 21.

¹⁹APSA, Briefing to Joint Logistics Review Board Ammunition Team, subject: Army Ammunition Production Base, 9 July 1969.

AMMUNITION

(4) Some perspective of the condition of the base is provided by a presentation at the 1968 Defense I&L conference held at Ramey Air Force Base, Puerto Rico.

"... I have been appalled at the millions of dollars that had to be spent and the time it has taken to activate our standby capacity for the present conflict. And then after spending these millions we are still left with processes and equipment which are worn out.... We may think and rightly so, that the 175mm gun we are using in Vietnam is the latest in modern design, but the government plant where projectiles are forged in Scranton, Pennsylvania, is limiting the firing rate because of continuous breakdowns of the wornout World War II equipment—a plant where the workers have walked out, not so much for wages, but in protest of the deplorable working conditions."²⁰

(5) One factor influencing this was the Department of Defense policy with regard to Government ownership of industrial facilities whereby:

"It is the policy of the Department of Defense to minimize Government ownership of industrial facilities insofar as possible in consonance with the need to assure economical support of essential defense production, maintenance, and research and development programs."²¹

The pursuit of this policy is attested to by top Department of Defense officials by the following:

"Our basic policy is that industry will provide all facilities needed to support defense production programs. Like all policies, however, provisions are made for exceptions—in this case, for situations involving high-risk defense programs impracticable for industry to support, and where substantial cost savings can be obtained.... The application of our policy is going to seek possible means of divesting ourselves of existing facilities for which Government ownership is not required to protect current or emergency requirements."²²

"To the extent that current [facilities] problems stem from the need to support our operations in Vietnam, I can recognize the uncertainties which cause your companies to hesitate to make substantial capital investments for increased production capacity.... I would encourage you to examine your plant capacity in terms of both civilian demand and for long term military programs. To the extent that additional capacity may be needed to meet requirements of this type, it should be financed with private capital."²³

(6) In a broad sense, the merit of this policy is unquestionable, and the record reflects that it has been vigorously pursued. However, the Vietnam experience highlights the need to weigh this policy in light of special considerations in the case of munition production, such as:

(a) Munitions production is a high-risk venture for private industry owing to the lack of demand for munitions production in peacetime and the uncertainties associated with the length of the war.

(b) The facilities and tooling peculiar to munitions manufacturing, coupled with the quantity of equipment required to produce at the desired rates, do not lend themselves in total to alternative commercial use.

²⁰Maj. Gen. Stanwix-Hay, USA, Presentation to the Defense I&L Conference, Ramey Air Force Base, Puerto Rico, subject: A Concept of Intensive Management, 31 October 1963.

²¹DoD Directive Number 4275.5, Industrial Facility Expansion and Replacement, p. 5.

²²Honorable Robert H. Charles, Assistant Secretary of the Air Force (I&L), Address at Annual Meeting of the Forging Industry Association, White Sulphur Springs, West Virginia, 26 May 1967.

²³Honorable Paul R. Ignatius, Assistant Secretary of Defense (I&L), Address before the American Forging Association, Chicago, Illinois, 16 November 1966.

AMMUNITION

(c) Profit motivation of private industry does not argue for retention of this equipment in peacetime; hence, the production base tends to evaporate with the cessation of demand.

(d) The cost of any capital investment by private industry, in munitions production equipment, is ultimately borne by the Government through tax write-offs and amortization in the cost of the item in production.

(e) The risk to private industry is intensified by the directed emphasis for obtaining maximum competition.

(f) Historically, the record reflects that private industry is reluctant to accept munitions production contracts without significant assistance in the form of Government-furnished facilities.

(g) The availability of the munitions production base at the onset of the Vietnam conflict, its condition and obsolescence notwithstanding, provided the munitions to sustain the conflict once the reserve assets were consumed.

(7) The foregoing argues for the fact that the munitions production base should in many cases be an exception to the Department of Defense policy, in realization of the need for a Government-owned munitions production base, both in-house and in private industry. An effort should be made to establish the content of this base and provide the minimum essential controls for its retention and maintenance during peacetime.

(8) The case against the retention of a Government-owned munitions production base, especially in the area of metal parts production is predicated on the assumption that private industry can accomplish this production at a lesser cost. The data displayed in Table 9 provides a comparison of unit prices between GOCO plants and private industry, for 81mm mortar HE, M374 metal parts. Unit prices for comparable quantities favors the GOCO plants. Those unit prices paid private industry include depreciation of plant equipment and amortization of contractor-furnished equipment. The unit price paid to a contractor operating a Government-owned plant only includes depreciation of plant equipment. Of significant import is the fact that within one to two years the contractor's costs for new equipment is written off and he owns the equipment, which he may retain or dispose of. If the latter occurs, then the production base no longer exists. In the case of the GOCO plant, the cost of the equipment has been amortized and the Government-owned equipment remains as a part of the production base available for future production.²⁴

h. Responsiveness of the Production Base

(1) With the advent of the buildup in SE Asia, the problem relating to insufficiency of munitions to sustain the resultant combat effort was not immediately apparent at the higher policy levels. The problem was obscured by (a) the unforeseen magnitude of the buildup, (b) the rapidity with which the buildup was accomplished, (c) the unforeseen rates of consumption and the delay in accepting these rates, (d) the introduction of new weapons systems, and (e) the introduction of obsolescent weapons systems. On the other hand, annual efforts were made within the Army and the Navy to upgrade the capability and condition of the munitions production base. However, these efforts were thwarted by program priorities within the Services and by overall budget limitations. As indicated earlier in this chapter, both the Air Force and the Marine Corps had their stated requirements of munitions assets on hand, and neither of these two Services faced the problem pertinent to a mobilization production base.

(2) In DOD Directive 4005.1, the principles of planning state that: "If the total post-M-Day military demand for material support is to be fully satisfied, the total stocks available

²⁴Department of Army, DCSLOG, Memorandum, subject: Cost Comparison Between GOCO and Private Industry, 10 October 1969.

AMMUNITION

on M-Day must be adequate to meet the demand until sufficient deliveries from post M-Day production can be realized." This is in effect the D-to-P concept. If the production base is to be responsive, adequate stocks must be on hand to sustain the combat effort until the production base can be activated and the P-Day objective achieved. The capability and condition (readiness) of the base determine the quantity of D-to-P assets or vice-versa.

TABLE 9
COMPARISON OF UNIT PRICE OF 81mm HE, M374 METAL PARTS
(GOCO VERSUS PRIVATE INDUSTRY)

Government-Owned	Award Date	Quantity -M-	Unit Price	Value-GFE*
Riverbank AAP operated by Norris Industries	30 Jun 66	1.070	\$6.195	\$3,402,533
	18 Jan 68	1.280	4.90	
	29 Mar 68	.563	4.52	
	28 Jun 68	.435	4.573	
	29 Nov 68	1.169	3.973	
Burlington AAP operated by Chamberlain Mfg. Corp.	21 Mar 66	2.650	\$4.2518	\$4,488,589
	16 Jan 63	1.403	4.18	
	28 May 68	.662	4.07	
	30 Sep 68	2.372	3.985	
<u>Private Industry</u>				
GMC and Allison Cleveland, Ohio	22 Mar 67	1.536	\$7.92	\$6,500,000
Hays-Alblon Hillsdale, Michigan	30 Jun 64	.378	\$4.58	\$765,400
	31 Mar 66	1.120	5.43	
	26 Apr 68	2.040	5.66	
	20 Dec 68	1.744	5.45	
Ingersoll Machine & Tool	29 Feb 68	.247	\$7.25	-0-
Presto-Lite	29 Feb 68	.281	\$7.39	-0-
GMC and Chevrolet Warren, Michigan	20 Jan 61	3.150	\$6.50	\$764,500
	29 Dec 67	1.736	5.44	
	21 Aug 68	1.736	5.38	

*Government-furnished equipment.

Source: Department of Army, DCSLOG Memorandum, subject: Cost Comparison between GOCO and Private Industry.

(3) A significant issue alluded to earlier in this monograph and paramount to any consideration of the munitions production base is the quantity of D-to-P assets to be retained during peacetime. The cost tradeoff between assets on-hand and readiness of the production base will often favor the latter. Stockpiling of assets in large quantities involves the risk of

AMMUNITION

obsolescence as well as shelf-life limitations. Of significantly more import, however, is the cost associated with the production of these stockpiles and the resultant costs of providing adequate storage and maintenance of the assets. On the other hand, the cost of maintaining a minimum level of assets to bridge the time necessary to activate an effective production line in a high state of readiness is considerably less when measured against the costs of maintaining a maximum level of assets and a production line in a low state of readiness. The cost effectiveness of this approach is attested to by a study conducted by the Navy Department on the 5"/38 and 5"/54 projectiles and cartridges.²⁵ Inherent in this approach are the conditional requirements that the required D-to-P assets be on hand and the corresponding readiness of the base be an accomplished fact.

(4) At the onset of the Vietnam conflict, neither of these conditional requirements were totally realized. Assets on hand were not entirely adequate to sustain combat operations until the production base was able to meet consumption, since the readiness of the production base was marginal at best. As indicated in Chapter II, at the onset of the Vietnam conflict, only the Army was authorized D-to-P stocks. Even so, funding was not authorized for achievement of this objective and the actual stocks on hand, left over from the Korean conflict, represented approximately 80 percent of the total authorized tonnage. This 80 percent included those stocks in excess to requirements and is not a true representation of actual requirements on hand. This observation is borne out by analysis of the status of munitions contained in Appendix D, which establishes that assets were generally adequate to meet the established worldwide inventory requirement. However, these assets were far short of the quantity necessary to sustain operations until an orderly P-Day could be achieved. Further analysis reveals that P-Day for certain munitions was only achieved by restricting the consumption until the production base was either established, rehabilitated, or expanded to produce to the desired rate of consumption. This rate was in excess of the planned mobilization rates for a significant number of munitions items.

(5) The significant problem areas as they impacted on the responsiveness of the production base pertinent to reactivation, requirements fluctuation, quality assurance, GOCO versus GOGO, and in-house capability versus private industry are discussed below.

i. Reactivation of the Production Base

(1) The mobilization plans in effect at the onset of the Vietnam conflict were not designed to support a Vietnam situation. This problem is treated in detail in the procurement portion of this chapter as it pertains to the response of private industry. However, the issue is reiterated in consideration of its impact on reactivation of the production base.

(2) Mobilization is defined as: "The act of preparing for war or other emergencies through assembling and organizing national resources; the process by which the Armed Forces or part of them are brought to a state of readiness for war or other national emergency. This includes assembling and organizing personnel, supplies, and material for active military service."²⁶

(3) Owing to the fact that the Vietnam War was classified as a counter-insurgency measure and emergency powers were not invoked, the planned mobilization producers were unwilling to participate in the munitions program. Their unwillingness was in part influenced by the concept, as implemented by the budget, that hostilities would end on 30 January 1966.

(4) The conclusions and recommendations appropriate to this issue are contained in the procurement portion of this chapter.

²⁵COMNAVORD, Letter 01491, subject: Naval Ordnance Systems Command 5" Ammunition Study, 25 March 1969.

²⁶Department of Defense Instruction 4005.2, Industrial Mobilization Planning Requirements.

J. Requirements Fluctuation

(1) As indicated in Chapter IV, considerable indecision prevailed as to what constituted the true ammunition requirements for the conduct of operations in Vietnam. Basic references were available, derived from analytical studies and prior experience which stipulated rates of fire, sortie rates and other expenditure factors. At the onset, these rates were deemed adequate and did not become a major issue, at least in procurement, until 1966. The real issues at the onset were the magnitude and schedule of force deployments, and the quantities and condition of assets on hand. During the initial reactivation of the production base, the changing criteria stemming from force deployments and stock status studies resulted in recurring revisions to initial production quantities. A given item of ammunition is nominally procured by component parts which must be integrated into a load, assemble, and pack schedule, concomitant with the production of the explosive fill and propellant. The slightest change in requirements further compounded a normally complex production scheduling problem. An appreciation for this complexity can be gained from analysis of the lead time chart contained in Figure 11. This complexity increases in consideration of the common componentry for a given item as evident from Figure 12.

(2) Additionally, the fluctuating requirements necessitated many changes in procurement plans to the extent that solicitations, contractors' bids, and the concomitant facilities projects were constantly being revised. This condition was further influenced by (a) the need to expand the base in those instances where SE Asia requirements exceeded that visualized in mobilization plans, (b) the need to establish a production base where none existed for obsolescent items and for new items of munitions, and (c) the peacetime restraints in effect.

5. SINGLE SERVICE MANAGEMENT OF MUNITIONS PROCUREMENT AND PRODUCTION

a. Background

(1) Single Service management as discussed herein encompasses only the procurement and production aspects of munitions management. Single Service management in this instance does not include the development of munitions items; neither does it include management of a munitions item once it is produced and turned over to the using Service.

(2) Prior to the entry of the Office of the Secretary of Defense into the area of assignment of procurement and production responsibilities in 1954, an era of mutual support prevailed among the military departments. In this era, the Services by tacit agreement coordinated to the extent deemed necessary in the procurement and production of munitions items. Over time, each of the Services, particularly the Army and Navy, had developed expertise and capability in procurement and production for certain munitions items. These resources were available for procurement and production of other Service requirements as necessary. This relationship based on existing capability prevailed subsequent to DOD entry into the field and continued to be the basis on which assignment of munitions procurement and production responsibilities was made by Service agreement. In effect the actions taken by the Department of Defense in formalizing the DOD Coordinated Procurement Program mainly served to continue assignments already in effect.

b. Criteria for Assignment. The assignment to a given service for the procurement and production of an item is made by the Assistant Secretary of Defense (I&L) in accordance with the policy and criteria established by the Department of Defense. The basis for making this assignment is as follows:

- "(1) The group, class, or items are in common use (i.e., used by two or more Military Departments).
- "(2) The items are generally identifiable by acceptable specifications, plans, drawings, purchase descriptions, etc.
- "(3) The items are procured in sufficient quantity on a repetitive basis to warrant a reasonable conclusion that some overall savings will accrue to the Government as the result of coordinated procurement.

AMMUNITION

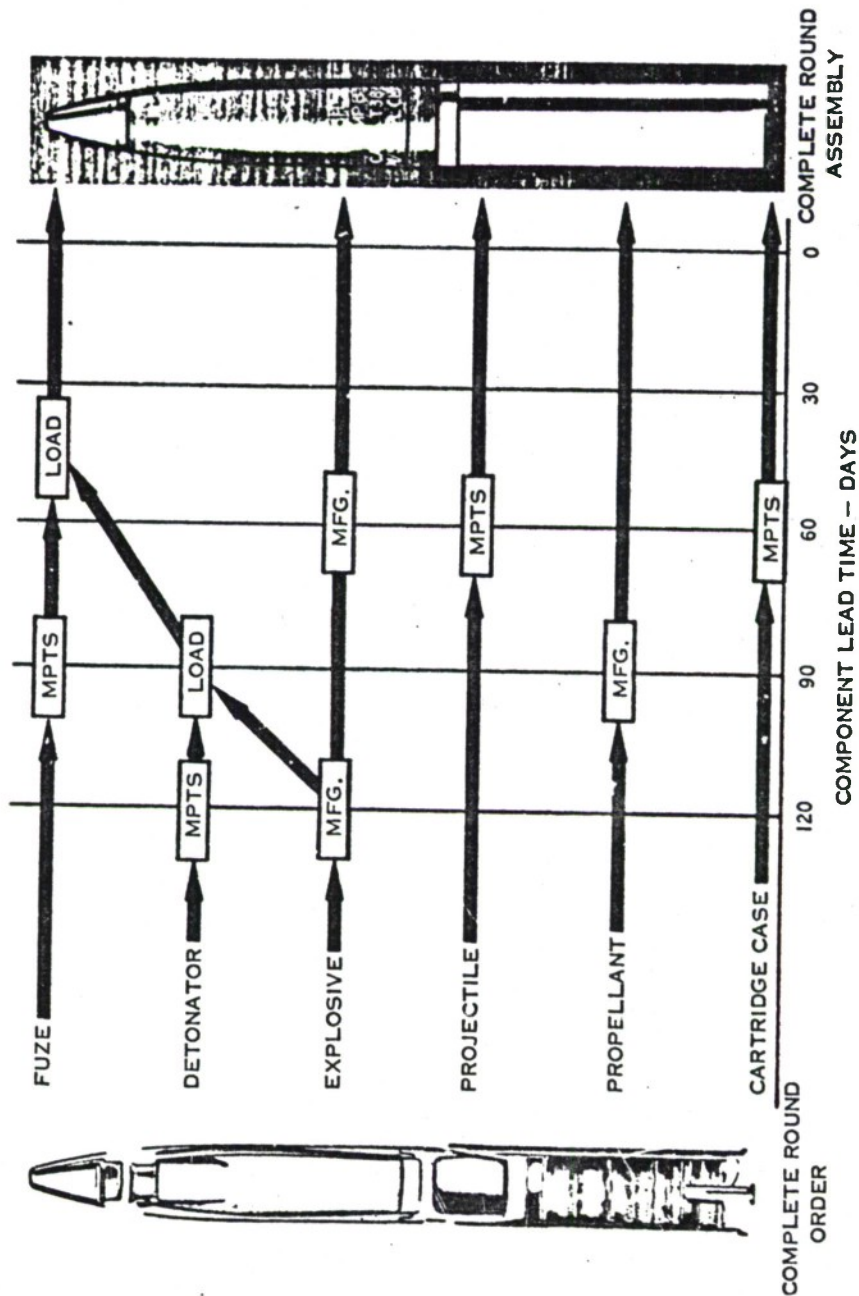


FIGURE 11. AMMUNITION COMPONENT INVENTORY, COMPONENT LEAD TIME

Source: U.S. Army, AFSA, Briefing to the Joint Logistics Review Board Ammunition Team, subject: Army Ammunition Production Base, 9 July 1969.

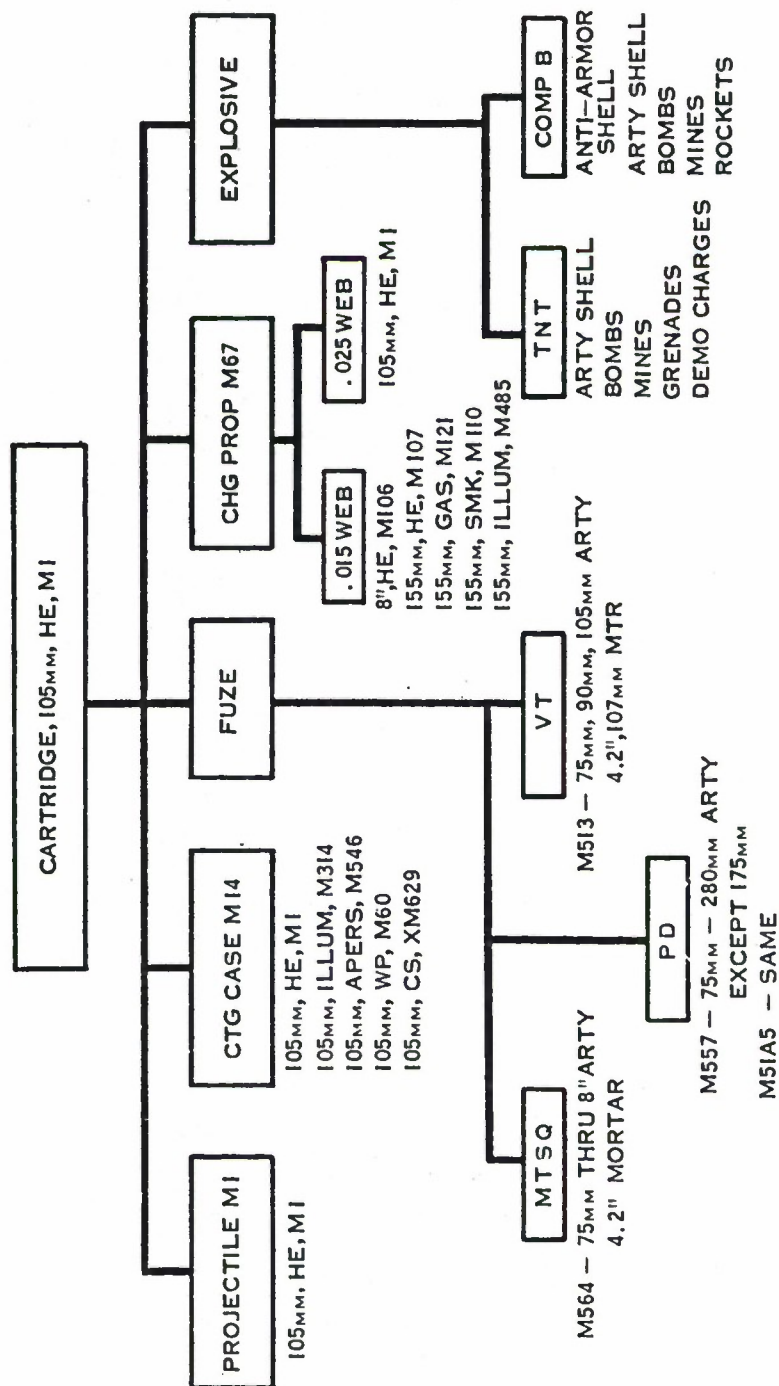


FIGURE 12. COMMON COMPONENTS, CARTRIDGE, 105mm HE, M1

Source: U.S. Army, APSA, Briefing to the Joint Logistics Review Board Ammunition Team, subject: Army Ammunition Production Base, 9 July, 1969.

AMMUNITION

"(4) Both peacetime and mobilization requirements will be included in arriving at the conclusion."²⁷

The assignee for a given item is "... responsible for providing prompt, efficient procurement service to the Requiring Department's stipulated delivery schedules unless otherwise agreed."²⁸ That Service also assumes responsibility for the provision and maintenance of the necessary facilities. Several exceptions to the assignments to military departments are stated. Those that pertain to munitions are as follows:

"D. Items in a research and development stage.

"E. Items subject to rapid design changes or to continuous redesign or modification during the production and/or operational use phases which necessitate continual contact between industry and technical personnel of the requiring Department to insure that the item procured is exactly what is required."²⁹

The procedures for a requiring Department to obtain an item from an assigned procuring Department are clearly established by the Department of Defense.³⁰ In addition, the specific assignments to the individual military departments are also published by the Department of Defense.³¹

c. Method of Assignment. Essentially, the published assignments for munitions items are effected by Federal Supply Classes (FSCs). These are broad classifications and do not, in many cases, reflect a commorality of material or process necessary to achieve the intended economies in procurement and production on which the DOD policy is predicated. Furthermore, in recognition of the existing Service capabilities that had evolved over the years, the responsibility of the individual Services for a specific Federal Supply Class was fractionated into partial assignments. Accordingly, exceptions for those FSCs assigned to the Army relate to naval ordnance within the cited FSC. Overall, the Army has 15 FSCs assigned in the munitions area, 11 of which are partial, and the remaining 4 in total. The Navy has 4 FSCs assigned, all of which are partial. It should be noted that for a given partial FSC assigned to the Army that exempts naval ordnance, there is not necessarily a corresponding partial assignment to the Navy, e.g., FSC 1375, Demolition material.

d. Effectiveness of Assignments

(1) In some instances, the current assignments of single Service management responsibilities for procurement and production have proved to be notably effective and have resulted in a responsive performance with respect to all requiring Services together with a streamlining of the entire process. Such an example is explosives, totally assigned to the Army with the sole exception of that capability retained by the Navy at Naval Ordnance Station, Indian Head, Maryland, for pilot and small bulk production of newly developed explosives, primarily applicable to unique Navy requirements. The homogeneity of both material and process associated with the production of explosives and the fact that it meets all the essential criteria for assignment, as delineated in DODINST 4115.1, are major contributing causes to the demonstrated effectiveness of its performance and the absence of other evolved Service capabilities. An assessment of some of the strengths associated with this clearly defined assignment of responsibilities to a single Service manager are:

"(1) Total resources of money, manpower, materiel, production facilities, and first destination transportation are at the disposal of a single manager.

"(2) It precludes competition among the services for available funds for facilities.

²⁷Department of Defense Instruction Number 4115.1, DOD Coordinated Procurement Program--Purchase Assignments, p. 3.

²⁸Ibid.

²⁹Ibid., p. 10.

³⁰Ibid., encl. 1.

³¹Ibid., encl. 2.

AMMUNITION

- "(3) It pinpoints responsibility for success or failure.
- "(4) It provides a better overall visibility of the program.
- "(5) It eliminates duplication of costs associated with administrative overhead, engineering, quality control, procurement, production, supply and storage.
- "(6) It provides for transportation economies through use of a distribution pattern for shipment of explosives from manufacturing plants to loading plants.
- "(7) It provides better control over production schedules.
- "(8) It permits allocation of assets on a more equitable basis.
- "(9) It precludes competition among the Services for available private industry capacity."

(2) The strengths associated with single Service management are offset to some degree by inherent weaknesses in the process. Obvious weaknesses that can be overcome through proper controls and integrated staffs are as follows:

- "(1) Concentration of management under a single Service could lead to abuse of prerogatives.
- "(2) Single Service management could inhibit to a degree the advancement of the state-of-the-art.
- "(3) Single Service management could result in a lack of appreciation for the needs of the other Services."³²

(3) Other examples of effective assignments based on a similar rationale and experience are grenades and chemical and biological fillers, totally assigned to the Army.

(4) Considerably greater ambiguity in the division of responsibilities as set forth in DOD Instruction 4115.1 exists in the case of bombs. FSC 1325P; Bombs, assigned to the Army, applies to bombs as listed in Department of Army Supply Manuals and Catalogs. It does not apply to bombs assigned to the Navy under a separate partial FSC. As currently prescribed, the Department of the Army is responsible for the procurement of fillers and the loading, assembling, and packing of toxicological, incapacitating riot control, smoke and incendiary munitions and for the loading, assembly and packing in excess of Navy-owned capacity.³³ By the same token the Navy is assigned the same FSC, "1325P; Bombs. This partial FSC assignment applies to armor-piercing, depth bombs, externally suspended low drag bombs, and components and practice bombs therefor, as listed in Ord Pamphlets. With respect to this assignment the Department of Army is responsible for the procurement of fillers and the loading, assembling, and packing of toxicological, incapacitating riot control, smoke and incendiary munitions and for other loading, assembling and packing in excess of Navy-owned capacity."³⁴ On the other hand, the Air Force—the largest user of bombs—has no assignment for bombs.

(5) The aforementioned example of FSC 1325 (Bombs) was selected for discussion because of its significance in the division of the total munitions procurement and production effort. For example, the load, assemble, and pack of MK 82 bombs is accomplished primarily by the Navy, but the Army was also involved to a limited degree, as it was requested by the Navy to load, assemble, and pack 20,000 MK 82 bombs each month. Although the Navy had adequate facility capacity to load, assemble, and pack all MK 82 bombs, the Navy decision to assign a portion of the load, assemble, and pack of MK 82 bombs to the Army was predicated on the fact that manpower restrictions prohibited activating their total capability. In addition, placing all load, assemble, and pack of MK 82 bombs in available Navy facilities could have resulted in saturation of the total capacity, thereby obviating any capability to meet increased requirements.

(6) In consideration of this division by design of procurement-production responsibility for MK 82 bombs, the process whereby the Air Force obtains MK 82 and M117 general-purpose bombs was established and currently remains as follows:

³²Department of Defense, Project Manager for Bombs and Related Components, Case Study, Explosive Production Base, sec. XI, 26 August 1969.

³³DOD Instruction 4115.2, encl. 2.

³⁴Ibid.

AMMUNITION

- (a) Complete MK 82 bombs are obtained by MIPR from the Navy.
- (b) Additionally a predetermined number of MK 82 bomb bodies are obtained from the Navy and furnished to the Army for load, assemble, and pack by MIPR.
- (c) Complete M117 bombs are procured by MIPR from the Army.
- (d) Fuzes are primarily procured from the Army by MIPR, however, the Air Force procures a minor quantity direct.
- (e) Fins are procured from the Army and Navy by MIPR as well as direct by the Air Force.
- (f) The balance of miscellaneous hardware necessary to make up a complete bomb is procured by the Air Force.

(7) Another facet of bomb production was the extraordinary extent of controls exercised by the Office of the Secretary of Defense through the Air Munitions Directorate of the OSD staff. This office, established in April of 1966, assumed specific control over all major air munitions to include the detailed approval of production quantities and schedules including designation of in-house producers as appropriate. Production schedules were officially directed to the military departments concurrent with direct notification to the procurement-production agencies within the Services. (See Chapter IV.) As an example, the loading of MK 82 bombs at Cornhusker is no longer a matter of interservice agreement but is specifically stipulated by the Office of the Secretary of Defense.

(8) Regardless of the number of working days in a month, which fluctuate from a low of 20 to a high of 23, the monthly production rate of bombs established by the Air Munitions Directorate was inflexible in that underruns or overruns had to be justified. For example, the production schedule in early 1969 specified 208,000 MK 82 bombs were to be loaded by the Navy. Based on a 22-workday month, this equates to 9,500 bombs per day. However, in a 20-workday month, this equates to 10,400 bombs per day.

(9) Pronounced variations in loading schedules created difficulties in the Navy's GOGO facilities. These are attributed primarily to the fact that the employee ceilings at the Navy's GOGO plants, where bomb loading was accomplished, were restricted by the Revenue and Expenditure Act. Since these ceilings could not be exceeded, any increase in bomb loading schedules required either extensive overtime or continued juggling of workload assignments to meet DOD-directed schedules.

(10) This situation in which the Navy procures and produces bombs for the Navy and Marine Corps, and both the Navy and Army procure and produce bombs for the Air Force is heightened by the fact that the Army is not a user of bombs. It is apparent that the Army remained in the bomb production business for reasons other than those stipulated as the basis of assignment by DOD policy and criteria. It is further apparent that the rationale for the Army's role in bomb production is directly relatable to capability. During World War II the Army, which then included the Air Corps, was a user of bombs and the capability was logically developed within the Army for the development and production of the required bombs. Subsequent to World War II, in 1946, the production equipment for bomb loading had been disposed of and the facility, Cornhusker Army Ammunition Plant, where bomb loading had been accomplished, had been leased out for storage of grain. Only the shells of the building remained. However, in early 1950, despite the Air Force then being a separate Service, the Army procurement expertise and latent production capability resulted in the Army awarding a contract to reconstitute this capability at Cornhusker, which remained in production through 1956. This time the facility was retained in a high state of readiness and it was reactivated in September 1965 with minimum

AMMUNITION

effort.³⁵ Thereafter the Army continued to be tasked to provide bombs because it had the capability.

(11) Owing to the fact that the production of metal parts and the loading of current high-usage bombs entail a considerable commonality of both material and process, they lend themselves well to assignment to a single Service procurement and production manager. Although no effort is made to quantify the cost savings that would accrue from a more streamlined assignment of responsibility, it is clear that lines of responsibility and management could be greatly simplified with greater attendant achievement of the advantages on which the existent policy is predicated.

(12) As indicated earlier, existing OSD assignments have evolved largely based on capability rather than conforming with the established DOD policy and criteria. This division of capability that has developed over time is largely attributable to the tendency for a given Service, whether or not charged with a partial FSC assignment, to establish an organic capability for the production of a service-developed item, even though this item may be homogeneous with another group of items or a process previously assigned. The most significant item that exemplifies this condition is fuzes, now assigned to the Army except for rotating VT fuzes and those associated with Navy-assigned ammunition prescribed as a Navy responsibility. There are reasons for fuzes to be in some respects unique as a result of end-use, environment, weapon and weapon system compatibility, etc. (See Appendix A.) At the same time the production of fuzes for military munitions requires specialized skills on the part of a manufacturer because of considerations of safety, accuracy, reliability, acceleration and shock, and the extremely critical tolerances associated with the electronic, chemical and or mechanical components. As a consequence, there is a limited production base available in the United States for fuze manufacture. This limited production capacity caused pronounced restrictions in the timely availability of many munitions during the Vietnam conflict. These total demands, including those for newly developed fuzes, placed a heavy burden on an already strained capability, and probably led to higher costs. In addition to steps to provide adequate fuze production capabilities, greater standardization, where practicable, would ease the problems. In any case, this is an area deserving special attention, including ensuring a full exchange of information, close interservice coordination, and consideration of the potential of selected single Service procurement and production.

(13) Incendiary bombs form another example of evolved capability in procurement and production. Although neither a major developer or user, the Army is assigned responsibility for procurement and production of incendiary bombs by DODINST 4115.1 in FSC 1325 (which includes all napalm bombs). In actual practice, however, the Navy and the Air Force have procured those firebombs (MK 77 and BLU series) that they have separately developed. This is also an area worthy of consideration for more effective single Service management.

(14) In consideration of the fact that the logical assignment of responsibilities for procurement and production of munitions is not a black and white situation, the point of diminishing returns must be determined and not exceeded. Full responsiveness to the needs of each Service must be ensured in this vital area, particularly in emergency wartime situations. For example, unless greater standardization proves to be practicable nothing would be gained if all artillery and ship gun munitions were assigned to a single Service for procurement and production although some components that make up these rounds can and do lend themselves to this, e.g., explosive filler and propellants. Additionally, with the general exception of explosive components, the more complex munitions, such as guided missiles and advanced air weapons, will continue to be more adaptable to package procurement policies managed by the developing Service. Yet within the broad spectrum of munitions, a significant number of items are manufactured by a common process and are all but identical in type. Examples of these items, to name a few, are as follows: explosives, small arms munitions, general purpose bombs, firebombs, and fuzes. In addition to evolved capability, assignment of responsibility for single service management of procurement and production should include due consideration to such factors as

³⁵ Department of Army, DCSLOG Memorandum, subject: Ammunition Logistics in Support of SE Asia Operations, 1965-1968, 5 September 1969.

AMMUNITION

the primary developing and using Service. Also inherent in the effective prosecution of such assignments of responsibility is the availability to the appointed manager of the total resources necessary to its accomplishment. It is fully realized that the question of transfer of existing equipment and/or facilities in accordance with these principles entails many tradeoff considerations and should be approached with constraint.

e. Project Managers

(1) As a concept closely related to that of single Service management, a brief review of the utility of project managers is in order. Though project managers, chartered at varying command levels, are extensively used within the three procuring military departments, there are instances where they are also appointed by and responsive to the Office of the Secretary of Defense, through the Secretary of a designated military department, and used in a multi-service role. The 2.75" rocket is an example of such a program. The use of project managers in this latter role is examined herein as it contrasts in some respects with the concept of single Service management of procurement and production.

(2) The most salient of the strengths of project management pertains to and stems from the assignment of total resources—money, manpower, material, production capability, and first destination transportation—to a single manager. In essence, the charter establishing a project managership for a given item includes the provision and control of these resources if its full effectiveness is to be achieved. The evolution of the 2.75" rocket program during the course of the Vietnam conflict is a case in point. The 2.75" rocket was initially developed and managed by the Navy; however, production responsibilities became fractionated among the Services as a result of individual Service requirements and corresponding developments. Prior to the ultimate conversion of the program to a tri-service project managed item in December 1965, production responsibilities were aligned as follows:

- (a) Army—Fuzes for Army, Navy and Air Force
- (b) Army—Warheads for Army and Air Force
- (c) Navy—Warhead for Navy
- (d) Navy—Motors for Army, Navy and Air Force
- (e) Each Service—Launchers.³⁶

(3) Because the Army had become the largest user and the fuze redesign was an Army effort, the multiservice Project Manager was selected from the Army.³⁷ The project manager was responsible for the 2.75" rocket warheads, fuzes, and components that were or would be placed in production. The project manager was delegated full line authority for centralized management of the project.³⁸ Subsequent to the establishment of the multiservice manager, the responsibility for motors and launchers was assigned to the project manager, making him totally responsible for the procurement and production of the entire 2.75" rocket system.

(4) It is noted that the 2.75" rocket project manager has no authority in the research and development area. This effort remains, and rightly so, the function of the user Services. However, the project manager does take cognizance of all research and development and encourages interchange of data between all elements and services.³⁹ Otherwise the authority of the project manager is identical to that authority normally vested in a single Service manager.

³⁶Office of the Tri-Service Project Manager for the 2.75" Rocket System, subject: 2.75" Rocket Case Study,

p. G-4.

³⁷*Ibid.*, p. G-4.

³⁸*Ibid.*, p. H-1.

³⁹*Ibid.*, p. H-2.

AMMUNITION

(5) The weakness of the situation initially surrounding the 2.75" rocket program was the fragmentation of responsibilities. Had the undivided responsibility for procurement and production been vested in a single Service, the establishment of a project managership at the Secretary of Defense level could well have been unnecessary. As indicated in paragraph d (above), demonstrable strengths are derived from single Service management where applicable. The success of these examples is attributable to the fact that they were adaptable to and logically assigned to such management and the responsible Service had the total resources to carry out the assigned responsibility. Hence, the same rationale that argues for project management can argue just as conclusively for single Service managership and more optimum use of the latter may obviate the need for the former.

6. CONCLUSIONS AND RECOMMENDATIONS

a. Conclusions

(1) Although the control measure that required Secretarial approval of shifts from competitive to noncompetitive awards provided a visibility of sole source procurement actions and its thrust was toward maximum emphasis on competition in procurement, it encroached significantly on the time nominally available to place a procurement (paragraph 3a).

(2) As a consequence of the failure to mobilize the national resources to support the Vietnam conflict, all mobilization agreements with private industry for the production of ammunition were invalid (paragraph 3b).

(3) The lack of administrative lead time in effecting munitions procurements impacts severely on the quality of the procurement actions and forces short-cut procedures, such as noncompetitive procurements or use of letter contracts and option clauses, which result in a less than quality contractual action (paragraph 3c).

(4) Of those exceptions, in the Armed Services Procurement Regulations, to award by formal advertisement, Exception 16 is, from a legal standpoint, more appropriate than Exception 2 or 14 for negotiated procurements designed to establish or sustain a mobilization production base (paragraph 3e).

(5) Future conflicts resulting in partial or total activation of the mobilization production base will require utilization of Exception 16 (paragraph 3e).

(6) Obtaining Secretarial approval of Class Determination and Finding for each fiscal year procurement of munitions during a given conflict creates a burden on the munitions procurement agencies (paragraph 3c).

(7) Procurement quantities and production schedules, during the Vietnam era, were predicated on expenditures and did not provide for unforeseen surges in demand. These surges created turbulence in procurement and production schedules. The impact of this turbulence would have been mitigated to an extent provided a reserve of assets had been retained in CONUS to maintain a constant level in the pipeline consistent with the demands on the consumer end (paragraph 3f).

(8) When the establishment, activation, or expansion of a munitions production base is estimated to cost in excess of \$1 million, two approvals are required. The first approval is by the Office of Secretary of Defense, through the budgetary process, and the second by the Assistant Secretary of Defense (Installations and Logistics) as required by Department of Defense Directive 4275.5. Increasing the Service Secretarial approval authority from the \$1 million level currently authorized in Department of Defense Directive 4275.5 to \$5 million would have permitted the Secretary of the Army to approve 88 percent of the number of facilities projects initiated during FY 1966 through 1969 while affording the Secretary of Defense the approval authority of 62 percent of the dollars (paragraph 4d).

AMMUNITION

(9) The Vietnam conflict demonstrated the validity of retaining in layaway the necessary Industrial Plant Equipment to support the munitions production base for future conflicts. The necessity for retention of this Industrial Plant Equipment lends credence to the necessity for rehabilitating and maintaining the equipment in the desired state of readiness while in layaway (paragraph 4e).

(10) The reactivation of the munitions production base, in response to the Southeast Asia conflict, was inhibited by the continuous change in quantitative requirements that hindered the orderly establishment of production capability and schedules (paragraph 4h).

(11) The lack of adequate D-to-P stocks did not provide the necessary lead time for an orderly progression to a normal P-Day (paragraph 4g).

(12) Federal Stock Classes do not form a sound basis for the assignment of responsibilities for ammunition production. As a result many deviations and exceptions to the prescribed Department of Defense policies and criteria exist (paragraph 5c).

(13) The assignment of responsibility and actual performance in procurement and production of munitions items more closely follows evolved organic capability than logical criteria related to homogeneity of material or processes (paragraph 5c).

(14) The division of responsibility and capability contributes to weapon and component proliferation and precludes the cost savings available from single Service management (paragraph 5d).

(15) The existing process whereby one military department procures munitions, and components thereof, from another military department is adequate (paragraph 5b).

b. Recommendations. The Board recommends that:

(1) In recognition of the absence of necessary lead time in war for awarding follow-on munitions contracts, the military departments identify those items to be procured from sole source producers. These items be exempted from mandatory competitive procurement during a contingency, with the understanding that competition will be introduced when the exigencies of the situation will permit (AM-9) (conclusion (1)).

(2) The military departments identify those munitions components that require long lead time for production. Establish the base for these items in peacetime by awarding firm contracts requiring maintenance of the desired state of readiness, necessary production planning, and maintenance of the pertinent technical data package to these planned producers in lieu of Mobilization Planning Schedules (DD 1519). Award on a competitive basis to these established producers those requirements that develop in peacetime that constitute economical production quantities (AM-10) (conclusions (2) and (3)).

(3) During peacetime the military departments develop and maintain, via annual update, Class Determinations and Findings in consonance with mobilization plans so that these Class Determinations and Findings can be immediately submitted for Secretarial approval when hostilities appear imminent or commence (AM-11) (conclusions (4), (5), and (6)).

(4) The approval authority of the Secretaries of the military departments for facilities projects pertinent to establishment or expansion of the production base, as set forth in Department of Defense Directive 4275.5, be increased from \$1 million to \$5 million (AM-12) (conclusion (8)).

(5) The military departments develop firm plans for relating funding tradeoffs between retention and maintenance of industrial production equipment and D-to-P stockage level objectives (AM-13) (conclusion (11)).

AMMUNITION

(6) The military departments initiate a joint review of ammunition procurement and production responsibilities for purposes of recommending changes to Department of Defense Instruction 4115.1, including adjustments in existing capability through transfer of facilities as required. Action be taken to consolidate general-purpose bomb responsibilities under the Navy, removing the Army from involvement in an item it does not employ. Other items that should be reviewed to determine the feasibility of single Service assignment are incendiary bombs, projectile fuzes, explosives, and small arms ammunition (AM-14) (conclusions (12), (13), (14), and (15)).

CHAPTER VI
PACIFIC THEATER
DISTRIBUTION AND SUPPORT OPERATIONS

CHAPTER VI

PACIFIC THEATER

DISTRIBUTION AND SUPPORT OPERATIONS

1. **INTRODUCTION.** This chapter contains a review of the adequacy of ammunition distribution and support operations during the Vietnam conflict. Primary emphasis is placed on the movement, storage, and distribution of ammunition in the theater of operation. The review is focused on points of logistic significance within the following subject areas:

- a. Ammunition movement from the continental United States (CONUS) to SE Asia
- b. Applicability of containerization concept
- c. In-country storage
- d. Packaging, palleting, and handling equipment
- e. Personnel.

2. DISTRIBUTION

a. General

(1) The ammunition distribution systems employed during the Vietnam conflict proceeded from those supporting an insignificant Military Assistance Program (MAP) requirement to full operation at a pace commensurate with the increasing requirements of the U.S. forces as the buildup in SE Asia progressed. Once the ammunition distribution systems were established in the theater of operation they had to be maintained with a high degree of flexibility to meet the changing needs of the deployed forces as the tactical situation developed. Concurrent with satisfying the immediate needs of U.S. forces engaged in combat in Vietnam, the system had to develop offshore ammunition reserve assets for future support and safety stocks to ensure continued support in the event of escalated requirements or interruptions in replenishment from CONUS sources.

(2) The buildup and resupply of sufficient air and ground ammunition to support combat operations in Vietnam presented perhaps the most difficult problem of the war. Although long lead times are typical of ammunition logistics, there often was little warning of the unplanned ammunition requirements during the Vietnam conflict. For example, Air Force munition expenditures, which average less than 500 short tons per month in 1964, increased to 2,576 tons in January 1965 and then to 22,734 tons by December. Management, employment, and distribution of scarce resources and means required imaginative action in an environment of frequent crises.

b. Movement

(1) General

(a) Throughout the Vietnam period, movement of ammunition to SE Asia held the highest cargo priority. The close balance between supply and demand for ammunition, the need for rapid throughput in the ammunition pipeline, and the relationship of transshipment capability of the ammunition terminals to ammunition requirements demanded precise planning in both movement and terminal operations.

AMMUNITION

(b) The timely movement of ammunition over a 10,000-mile pipeline thoroughly tested concepts and techniques of movement control and the capability and responsiveness of the transportation agencies and port facilities. Many lessons have been learned and a number of new procedures have been developed as a result of the problems encountered. Those of particular significance, which will contribute to a fuller understanding of the ammunition distribution system during the Vietnam era or warrant consideration in future planning, have been selected for review.

(2) Ocean Shipping

(a) The rapid buildup of U.S. forces in Vietnam created an early problem stemming from the lack of immediately available cargo ships to meet the total demands. Since the movement of ammunition held the highest cargo priority, its movement was constrained only by the availability of cargo vessels. However, this priority was tempered by the demands for lift of other material in an era that saw an expansion of the need for ship bottoms to meet the requirements evolving from the buildup in SE Asia. During this same time frame (early 1965) the Military Traffic Management and Terminal Service (MTMTS) was established (February 1965). The working interface between the Military Sea Transportation Service (MSTS), MTMTS, and the Service inventory Control Points had not been fully developed. All of these factors contributed significantly to the problem of ammunition movement to SE Asia in the early stages of the buildup. The complexity of the problem was heightened by piecemeal deployment of forces with little or no lead time for ammunition movement planning.

(b) The demands placed on MSTS to move ammunition from CONUS to SE Asia during the Vietnam conflict have been unremitting. The magnitude of the effort is illustrated in Figure 13, which reflects the movement of millions of measurement tons (MTON) of ammunition from December 1964 through the end of calendar year 1968. Tonnage of ammunition moving from the east coast escalated from 60,000 MTON in June 1965 up to 1.4 million MTON in 1968. From the west coast, the tonnage of ammunition started at 70,000 MTON and increased to 1.5 million MTON in 1968. The total of all ammunition shipments from both the east and west coast was about 2.9 million MTON for calendar year 1968.¹

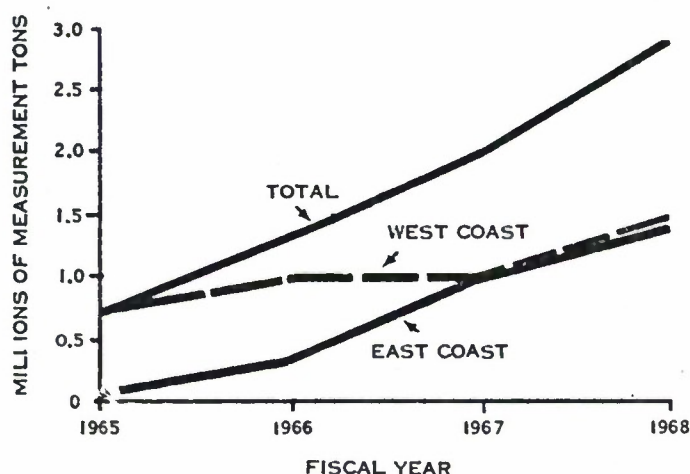


FIGURE 13. CONUS OUTBOUND AMMUNITION LIFT

Source: Military Sea Transportation Service, Presentation for the Joint Logistics Review Board, 19 July 1969.

¹Military Sea Transportation Service, Presentation for the Joint Logistics Review Board, 19 July 1969.

AMMUNITION

(c) "In 1965, as today, MSTS Nucleus Fleet ships, chartered Merchant Marine ships and General Agency Agreement (GAA) ships from the Reserve Fleet comprised the MSTS Controlled Fleet utilized for the movement of ammunition from CONUS to SE Asia. By FY 67, the average number of ships engaged in ammunition movement had climbed to 100. In the succeeding two years, the average reached 130. The peak of 160 ships was reached in June 1968."² The problem was not primarily one of numbers, but rather one of quality and timeliness. Most of the ships utilized for the movement of ammunition were GAA vessels built in World War II and operated by commercial carriers. As a result there were shipping delays caused by crew shortages and maintenance problems.

(3) Outloading ports

(a) The second problem was one of congestion at CONUS outloading ports. With the advent of World War II, ammunition outloading facilities capable of sustaining logistical support to overseas theaters were established at the Naval Ammunition Depot (NAD), Earle, on the east coast and at Bangor and Concord on the west coast. In addition, the Naval Weapons Station (NWS), Concord, served as the outloading facility of Pacific Fleet AEs and was the logistical support facility for providing all weapons and ammunition to these ships. The NWS, Seal Beach, provided principal ammunition logistic support to First Fleet units.

(b) With the commencement of the Vietnam buildup in early 1965, NWS, Concord, became the focal point for the vast majority of ammunition outloaded to SE Asia for all Services. These facilities quickly became glutted. There were many reasons for this. Planning for the buildup of capabilities was insufficient, hiring of experienced personnel was difficult, and material handling equipment (MHE) had been allowed to deteriorate through lack of funding.

(c) Discontinuous cargo throughput with continuous input, together with difficulties in overall coordination, was a major problem. The MTMTS controlled movement of ammunition into Concord to meet the shipping requirements of the Inventory Managers of the various Services, whereas MSTS controlled ship assignments and the arrival and departure of ships. Last minute changes, late cargo arrivals, and late ship arrivals and departures compounded the ship loading and load planning by the port. Concord had no controls by which it could turn off inbound shipments when the physical storage and holding areas reached saturation. The Army was directed to ship through Concord, costs notwithstanding, because of the shorter transit time to Vietnam and the availability of ammunition stocks at western depots. The Joint Chiefs of Staff permitted the Air Force to apply the "free-flow" concept in handling ammunition shipments to outloading ports for loading on Air Force SPECIAL EXPRESS ships. Under this procedure, Western Area Military Traffic Management and Terminal Service (WAMTMTS) exercised no control over shipments coming into Concord. Rather, they were sent direct from production to temporary storage at Concord as a CONUS domestic movement under MTMTS-issued Standing Route Orders (SROs) and automatic release.³

(d) By September 1965, Naval Weapons Station, Concord, was in a six-ship loading operation using two 10-hour shifts 7 days a week. Railroad cars and truck vans on board averaged 1200 and 75 daily respectively, as compared to a maximum of 1172 to be handled per month. A dangerous explosive hazard existed. Because of a shortage of railcars nationwide and to avoid excessive demurrage charges, ammunition was unloaded in selected open areas.⁴ This tie-up of railcars resulted in a conference at Concord chaired by the Assistant Secretary of Defense (I&L) on 18 October 1965, which recommended a more precise system of phasing ammunition-loaded railcars into outloading ports so that a maximum outloading rate of 120,000 MTON per month would require no more than 555 railcars on station at one time.⁵

²Ibid.

³Department of Army, DCSLOG Memorandum, subject: Ammunition Logistics in Support of SE Asia Operations, 1965-1968, 1 August 1968.

⁴CO, NWS, CONCORD, Speedletter, Serial 11240, 10 September 1965.

⁵WAMTMTS, Letter, MTW-AMCO, subject: Control of Rail Cars into Naval Weapons Station, Concord, 19 September 1966.

AMMUNITION

(e) Other concepts having an impact on outloading operations were Complete Round Ammunition Shipments (CRAMSHIP) to be discussed in paragraph 2a(6), and Expedited Air Munitions or free-flow. Introduced in February 1966, CRAMSHIP required the Inventory Control Points (ICPs) to package their cargo offerings to MTMTs. The impact at Concord was the problem of uneven flow of the material that had to be put aboard the same ship. Until adequate Transportation Control Offices were established at the respective ICPs, this disrupted ship loading plans, sometimes calling for offloading of material to maintain complete round integrity. Free-flow was a procedure for "push" rather than "pull" of controlled air munitions and was placed in effect by the Joint Chiefs of Staff on 1 July 1966.⁶ Monthly production objectives were tailored to anticipated expenditures by the Office of the Secretary of Defense (OSD) and marked by the ICPs for specific cargo packages. Any variation in flow was felt at tidewater as shortages that delayed sailing or caused cancellation resulted in unused shipping space. On the other hand, excess production became a temporary storage problem requiring increased demurrage or double handling.⁷

(f) In an attempt to alleviate congestion problems at NWS, Concord, the Air Force resupply program for Guam as well as Navy and Marine Corps outloading of air munitions for SE Asia were shifted to NAD, Bangor, by July 1966. More effective coordination and control over the movement of ammunition and ships into Concord, together with the expansion of port loading and storage facilities at the port, permitted the station to reach a peak outloading rate in June 1968. (See Figure 14.)

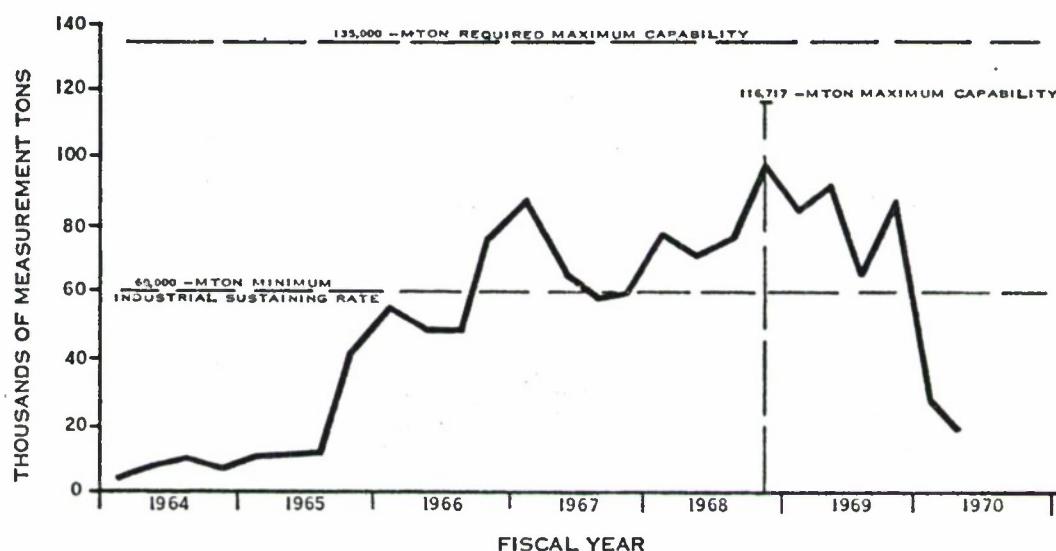


FIGURE 14. NWS, CONCORD, MTMTS MANIFEST CARGO OUTLOADED

Source: Naval Weapons Station, Concord, Briefing to the Joint Logistics Review Board Ammunition Team, 19 July 1969.

(g) Cost effectiveness consideration of lower rail rates from points east of the Rocky Mountains to east coast ports led to a major shift to Sunny Point, North Carolina, as the primary outloading port for Army and Air Force munitions. The bulk of Army ammunition rate favorable to the east coast was shifted to Sunny Point in October 1965. The Air Force

⁶MSTS, Presentation to the JLRB, 19 July 1969.

⁷NWS, Concord, Briefing to JLRB Ammunition Team, 29 July 1969.

AMMUNITION

resupply program for Guam was moved from NAD, Bangor, Washington to Sunny Point in January 1967 and the resupply program for Vietnam and Thailand was shifted from NWS, Concord, to Sunny Point by mid-year 1969. The sharp drop-off in outload tonnage at NWS, Concord, to 20,000 tons in August 1969, as opposed to the earlier requirement of a 90,000-ton capability to meet Army and Air Force outload needs—peaking to 98,000 tons in May 1969—had a serious impact on the station and resulted in a sizeable reduction in force.⁸

(h) In carrying out Department of Defense (DOD) policy of using lowest overall transportation and port handling costs in determining the routing and movement of cargo, fluctuations of ammunition outloading operations at west coast and east coast ports were experienced as rail rates were raised or lowered by western railroads. As a result, planning and port operations were adversely affected.

(4) Offloading Ports

(a) Another problem was one of port congestion in SE Asia. Although this was generally recognized in contingency plans, throughput development took time. During this period, there was serious port congestion. As a result, the combat forces were handicapped by the difficulty of obtaining their most urgent requirements, an accumulation of ships were waiting to offload, and there was an urgent requirement for the expansion of ammunition offloading facilities. Heavy reliance was placed on the ports of Saigon, Qui Nhon, Da Nang, and Cam Ranh Bay owing to their strategic locations. All deep draft vessels entering these ports had to offload in the stream and the ammunition barged ashore as there were no deep-water piers capable of ammunition ship discharge. This was the situation at Da Nang, where there were no deep-water piers, and heavy weather during the monsoon season often forced shut down of discharge operations. Ammunition backloading requirements superimposed on Da Nang for Chu Lai and other I Corps Tactical Zone (CTZ) locations further aggravated ammunition discharge operations at that port. Some relief was realized by LST shipments direct from Subic.

(b) Ammunition throughput capability at Vietnamese ports was initially aggravated by bunched arrival of ships as the result of irregular scheduling from CONUS to SE Asia, limited lighterage and personnel to work the ships, and insufficient temporary holding areas and storage facilities ashore owing to the inability to acquire adequate real estate. As a result, ammunition ships arriving in Vietnamese waters often had to wait until discharge could be effected. This impacted on port congestion, ship tieup, and costly demurrage, not to mention the delay in delivery of ammunition required by the combat forces ashore.

(c) Port congestion and ammunition ship backlog were matters of urgent concern to all echelons of command. For example, a survey taken during December 1965 of all ships scheduled for Vietnam indicated that there were 52 ships with an estimated total of 165,000 short tons (STON) of ammunition aboard. This was a problem area of considerable concern to the Commander, U.S. Military Assistance Command, Vietnam (COMUSMACV), since the 165,000 STON of ammunition aboard these ships represented approximately 2 months receipts based on forecast requirements for January 1966.⁹

(d) Immediate steps were taken to relieve the 24 December 1965 backlog (48,000 STON), which was distributed at the ports of Saigon, Qui Nhon, Da Nang, and Cam Ranh Bay. These included (a) improvement in ship scheduling, (b) utilization of Landing Ship Tanks (LSTs) capable of shallow-draft discharge for the movement of ammunition from forward theater depots to Vietnam, and (c) utilization of deep-draft vessels as floating ammunition depots in Vietnamese waters. Follow-on action included construction of a deep-water ammunition pier at Cam Ranh Bay and improvement of ammunition offloading capabilities over the shore at other ports.

⁸NAVORD, Message 301425Z June 1969.

⁹COMUSMACV, J4 Briefing for General Besson, 9 January 1966.

AMMUNITION

(5) Transshipment ports. An additional problem encountered during the early buildup was one of port capacity at the Naval Magazine (NAVMAG), Subic. As NAVMAG, Subic, became saturated, immediate steps were necessary to relieve the congestion. Initially, barges, buoys, emergency ramp capabilities, and increased personnel partially solved the problem, and follow-on action resulted in the construction of a deep water wharf and a deep-water pontoon wharf. These facilities, together with increased handling equipment and additional magazines, made NAVMAG, Subic, the largest WESTPAC naval magazine. The monthly average throughput of 12,000 STON of ammunition in 1965 was increased to 30,000 STON during 1966. Improvements were also made at the Naval Ordnance Facility (NAVORDFAC), Sasebo, to handle the increased requirement for Marine Corps ground ammunition and at the NAVMAG, Guam, primarily to handle the increased throughput requirements to support Strategic Air Command B-52 forces.¹⁰

(6) Airfield congestion. The attempt to move ammunition to Vietnam by air during the early buildup resulted in many difficulties. In early 1965, only three jet-capable airfields were in South Vietnam: Bien Hoa, Tan Son Nhut, and Da Nang. Each was crowded with a variety of U.S. and Vietnamese Air Force (VNAF) aircraft. This complicated the handling of massive amounts of ammunition delivered by air to South Vietnam. In addition, shortages of material handling equipment (MHE) also aggravated the problem. The problem of handling ammunition air shipment at Tan Son Nhut was more pronounced as the airfield was extremely congested and did not have sufficient personnel or equipment to properly offload the ammunition when it arrived. The Tan Son Nhut Ammunition Supply Point (ASP) had a limited storage capacity of approximately 1500 STON and was utilized primarily to store ammunition used by Air Force and Army helicopter units in support of Vietnamese forces. As a result, most of the ammunition airlifted to Tan Son Nhut had to be transported by truck through Saigon to Vung Tau and the ammunition depot at Long Binh.

(7) Special Procedures

(a) General. Many special procedures were used in ammunition distribution during the Vietnam era. They included techniques necessary to support special Service requirements, new procedures to cope with specific problems encountered, and tests of new concepts in a combat environment. Those of particular significance, which will contribute to a fuller understanding of the ammunition logistics system in Vietnam or warrant consideration in future planning have been selected for review.

(b) Containerization

1. In April 1966, the Army tested the feasibility of shipping ammunition in CONEX containers to Vietnam. Based on the results of the test, a decision was made to continue to palletize ammunition and ship it break-bulk. Even though the size of the CONEX was disadvantageous for the shipment of ammunition and it had to be handled by a completely break-bulk oriented system with antiquated rate structures, many advantages were reported.

2. In June 1969, the Joint Logistics Review Board (JLRB) informally requested the Army, MSTS, and MTMTS to further explore the possibility of containerized shipment of ammunition to Vietnam through the use of a self-sustaining container ship and immediately available dry cargo containers. The Deputy Assistant Secretary of Defense, in a Memorandum dated 23 August 1969, tasked the Army and Navy to investigate the feasibility of such a test and to prepare a proposed test plan. The Army developed and tested the procedures and specifications for stuffing, blocking, and bracing ammunition in the containers and also tested the loaded containers.

3. The MSTS contracted for a converted C-2 self-sustained container-ship, with a capacity of 226 containers, to be on berth at NWS, Concord, on 22 December 1969. The Army designated five inland points for stuffing containers and specified the number required at each location. MTMTS arranged for their positioning and furnished highway routings

¹⁰CINCPACFLT, Briefing to the Joint Logistics Review Board, 9 September 1969.

AMMUNITION

on all shipments, as no authority had been obtained for shipment by rail—either piggyback or container-on-flatcar.

4. The containership was loaded with more than 3,200 tons of ammunition in 16-1/2 hours by 31 personnel. The Pacific crossing was made under heavy weather conditions without damage to the cargo. Discharge and back-loading was accomplished at Can Ranh Bay in slightly less than 24 hours. Some container-loads of ammunition were delivered to ammunition supply points in the Cam Ranh Bay area, others were transshipped by roll-on and roll-off lighterage to Qui Nhon and then delivered by highway as far inland as Pleiku and Ban Me Thout.

5. These tests indicated that the reduction of in-port time for containership loading and discharging as compared to that required for break-bulk operations, together with the accompanying shorter turn around time of the ship could greatly reduce the requirements for the number of ships engaged in transporting ammunition. Also, the elimination of double handling at the terminal could increase throughput capacity.

6. A study made by NWS, Concord, on ammunition shipments for FY 68 shows a cost of approximately \$16 million for break-bulk port handling. It was considered that, if the shipments had been containerized, the same amount could have handled with a total savings of over \$11 million of which \$6 million is attributable to personnel.¹¹

7. The rapid decline and deterioration of break-bulk ships in the U.S. Merchant Marine and the trend toward containerization in new ships indicates that the Services and the Department of Defense should take aggressive action to refine and improve on the distribution of ammunition by a totally integrated container system. Particular attention must be given to handling containers in any future contingency. In this regard, MACV was requested to conduct a test of discharging a self-sustaining containership offshore in Vietnam waters.¹² This will test the adequacy of equipment and lighterage in the current inventory to handle containers from offshore and over the beach. It should also serve as a point of departure in the development of Service logistic doctrine and equipment required for future operations.

(c) Underway Replenishment

1. The requirement for ships and aircraft of the Seventh Fleet to conduct sustained high-intensity combat operations severely tested the Underway Replenishment (UNREP) system. The inherent flexibility of the technique, however, combined with skillful scheduling and close management, proved more than equal to the task. The UNREP system was utilized to support Seventh Fleet ships on Yankee and Dixie stations, as well as those engaged in MARKET TIME operations, is shown in Figure 15. Fleet Ammunition Issue ships (AE/AOE), loaded in CONUS or at NAVMAG, Subic, would proceed to Yankee or Dixie station to replenish aircraft carriers, whose normal resupply cycle was every third day. The issue ship would then proceed to replenish MARKET TIME forces for 2 days before returning to again resupply the carriers. This cycle would continue for an average of 21 days, at which time the issue ship, its ammunition supplies exhausted, would return to Subic Bay for reloading. It is important to note that the final pipeline to the Seventh Fleet required an average of about 12 additional days from the time a cargo ship arrived at Subic from CONUS until the ammunition was issued to an on-station carrier, and about 17 days until it finally reached a gunfire support ship on the line.

2. Figure 16 depicts ammunition resupply in support of Marine Air and Navy Forces ashore in Vietnam. To maximize on-station time, Seventh Fleet In-Shore Fire Support Ships (LSMRs) were supported by in-port replenishment from the tri-service ammunition depot at Cam Ranh Bay. Requirements for Navy munitions for GAME WARDEN and Perverine Forces in the II, III, and IV CTZs were provided from Cam Ranh Bay whereas common munitions were provided by the 1st Logistical Command, U.S. Army, Vietnam, with requirements coordinated by Navy Support Activities, Saigon.

¹¹NWS, Concord, Study, subject: Containerization of Ordnance for Naval Outloading, 9 September 1969.

¹²Chairman, JLRB, Message to COMUSMACV, 201300Z November 1969.

AMMUNITION

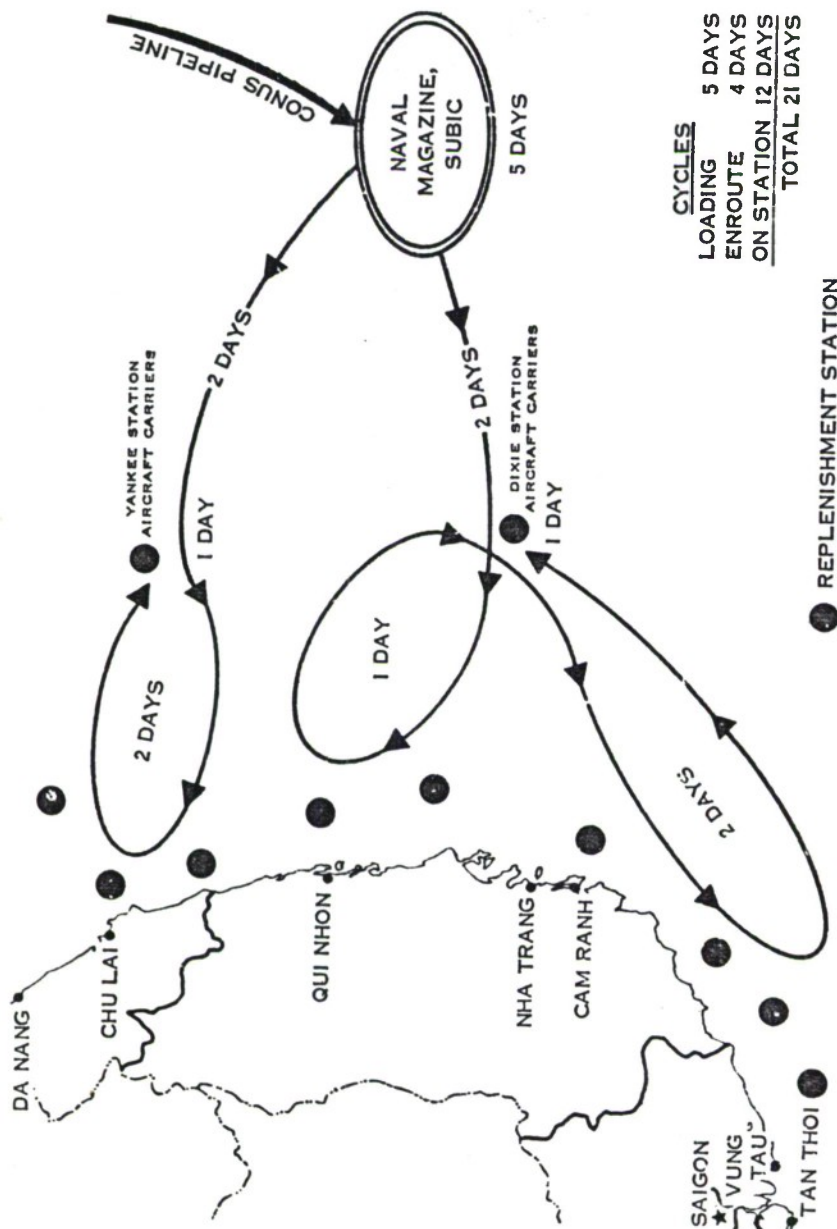


FIGURE 15. AMMUNITION RESUPPLY IN SUPPORT OF SEVENTH FLEET

Source: Comdr. H. Dickson, Navy Ammunition Information and Control Systems in Pacific, July 1969.

AMMUNITION

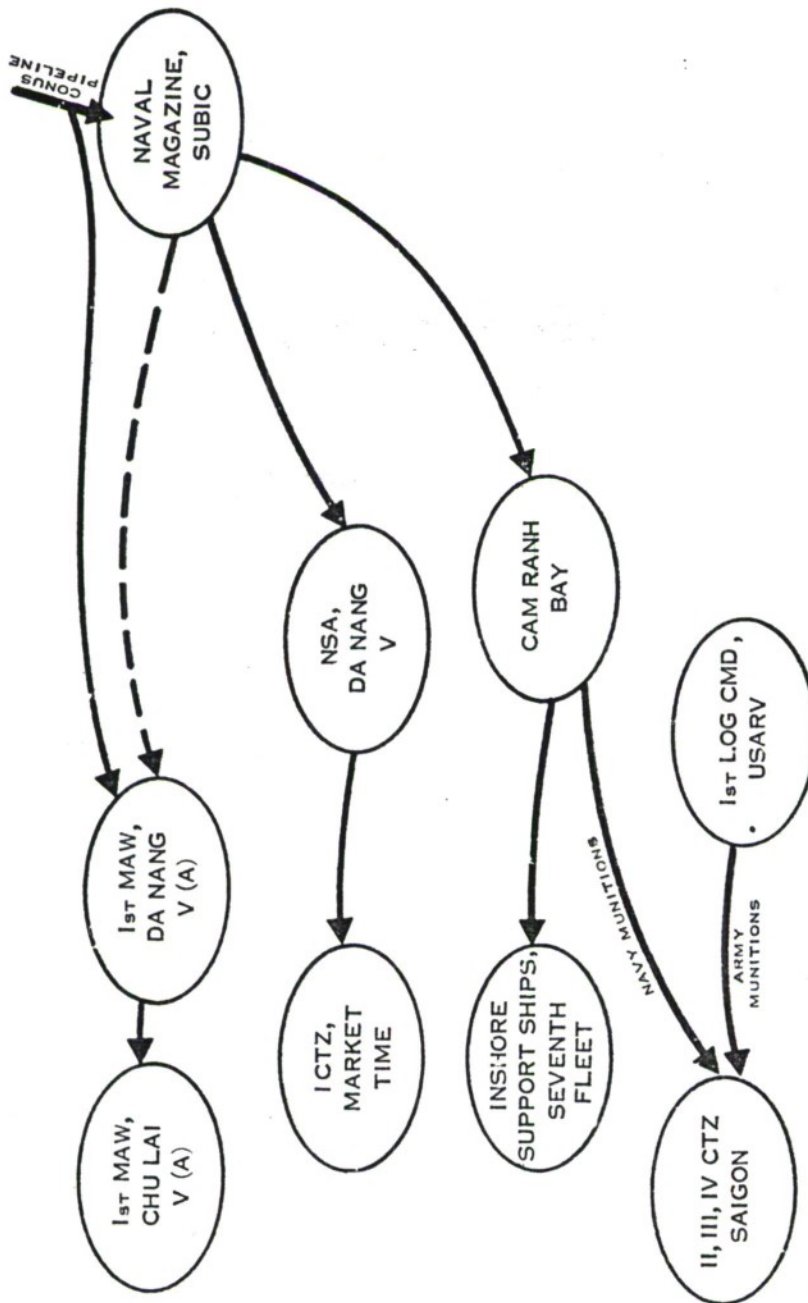


FIGURE 16. AMMUNITION RESUPPLY IN SUPPORT OF RVN

Source: Comdr. H. Dickson, Navy Ammunition Information and Control Systems in Pacific, July 1969.

AMMUNITION

(d) CRAMSHIP

1. A serious problem encountered by the Navy in ammunition movement from CONUS to SE Asia during the early buildup in Vietnam was that all the components necessary to assemble a usable round of ammunition were not shipped on the same vessel. This was particularly critical with aircraft bombs, which consist of up to 13 components. Bomb bodies might be available in adequate quantities, but unusable because fins, fuzes, boosters, or other components were not available. Steps were initiated in September 1965 to get shipments by complete rounds. In February 1966 the Navy complete round ammunition shipment (CRAMSHIP) procedures were implemented, which provided a means of identifying all of the components necessary to assemble a complete round and ensuring they were shipped with the bomb body. The adoption of CRAMSHIP procedures by the Navy permitted:

a. The opportunity for port reconsignment by ship diversion, since a complete round of each end item was shipped and controlled as an entity, vice separate shipment of the individual components

b. Improved temporary handling and stowing at offloading ports

c. More effective control by logistic and operational commanders by reducing the chance of maldistribution of component assets.

As for adverse effects, the CRAMSHIP concept occasionally caused some delay in the movement of specific items of ammunition as ship delays could occur at CONUS outloading ports as a result of the shortage of a single component. Also, inert components such as fins were required to be shipped as ammunition cargo at premium rates.

2. The problem encountered by the Navy with separate shipment of munitions components equally applied to the Air Force. As a result, in September 1965, Pacific Air Forces (PACAF), advised the Air Force Logistic Command that all future shipments of munitions to SE Asia would be in complete rounds unless otherwise directed or approved by the PACAF Ammunition Control Point. The complete round was to include all components such as fins, fuzes, and adapter-boosters necessary to assemble the finished product for delivery by aircraft.¹³ The Air Force later adopted the Navy-originated term CRAMSHIP to identify this procedure.

(e) SPECIAL EXPRESS

1. One of the earliest problems to plague the Air Force was the time involved in routing all air munitions destined for combat units in Vietnam through the main support base at Clark AB. This was solved by the adoption of the SPECIAL EXPRESS system, which both flowed munitions directly from CONUS to the user and overcame limitations caused by inadequate and vulnerable storage areas at bases in Vietnam.

2. In April 1965, five ships were assigned by the MSTs to the exclusive use of the USAF for air munitions movement from NWS, Concord, to South Vietnam. Under the SPECIAL EXPRESS concept, these ships were scheduled for 150-day round trips and served as both ocean carriers and afloat depots at one or more discharge ports. Several unique features were permitted that are not normally found in regular point-to-point shipping, which included:

a. Utilization of ships and munitions storage depots afloat

b. Single port outloading (NWS, Concord)

c. Loaded for selective discharge

¹³PACAF, Message DMS 44843 to AFLC, subject: Munitions Support and Complete Round Control, 24 September 1965.

AMMUNITION

d. Exclusive use for USAF air munitions, with PACAF controlling ship movements through MSTs and controlling discharge through local port authorities.

e. Discretionary loading of a wide range of items or a single type.

3. This concept proved so successful that by June 1966, USAF was operating 19 SPECIAL EXPRESS ships and the Navy started using 4 ships under a similar system. However, on 16 August 1966, the Assistant Secretary of Defense (I&L) requested the Special Assistant for Strategic Mobility, Joint Chiefs of Staff (SASM) review the concept with particular emphasis on the impact on the DOD Transportation and Traffic Management System. The review concluded it was a departure from the normal system and recommended its discontinuance. The CINCPAC, when queried by SASM, recommended continuing the SPECIAL EXPRESS system until stockage objective and storage capacities could be re-evaluated. On 19 November 1966, CINCPAC completed the evaluation and recommended return of SPECIAL EXPRESS ships to full MSTs control, and this was subsequently directed by the Joint Chiefs of Staff in January 1967. By that time, this system had moved about 750,000 tons of air munitions to SE Asia.

4. The Air Force replaced SPECIAL EXPRESS with a new system entitled SPECIAL VESSEL. Under this new concept, various significant changes were introduced into the Air Force air munitions transportation management system. Ships were no longer loaded as floating warehouses to be routed from destination to destination. Instead, they were loaded with complete round air munitions and routed directly to single or multiple destinations. With the advent of the SPECIAL VESSEL era, MSTs was notified 31 days prior to required berthing date, and sufficient ships were furnished to meet Air Force requirements. During 1966, the year the SPECIAL VESSEL concept was initiated, an average of five ships per month departed CONUS, carrying Air Force air munitions to SE Asia. This program was increased until by the end of the calendar year 1968, an average of 22 shiploads of Air Force air munitions departed CONUS each month.¹⁴

5. Despite the success of the SPECIAL EXPRESS and SPECIAL VESSEL systems, many high priority shipments of air munitions required airlift to SE Asia. Utilization of Military Airlift Command Channels flights caused rapid saturation of the limited ammunition storage area at Travis AFB and created excessive backlogs. Therefore, on 3 March 1966, the Air Force initiated the USAF SE Asia Airlift Transportation Pipeline System (SEAIR). Under this system, three aircraft left Hill AFB each week carrying top priority air munitions directly to SE Asia. Hill AFB had been selected because it is the location of the Air Force Inventory Control Point for all ammunition and possesses a major explosive storage complex. The program was so successful that on 1 April 1966 it was expanded so that one special mission aircraft left each day.¹⁵

c. In-Country Storage

(1) Requirement for Real Estate

(a) Ammunition storage problems existed in Vietnam from the very beginning of the buildup in 1965, and in 1969 solutions still had not fully caught up with expanding needs. Procurement of adequate real estate for dispersed storage of the massive quantities of air and ground ammunition pushed into Vietnam was a time-consuming process never fully achieved. Waivers were necessary to permit the maintenance of the stockage on the ground in the combat zone otherwise not possible if Service established quantity-distance safety criteria were met. Construction of adequate ammunition storage facilities was subject to Military Construction (MILCON) procedures, priority allocations, and required long lead times. Major ammunition storage construction projects were underway as late as 1969.

¹⁴Hq, USAF (AFSSS), Letter, subject: Munitions Logistics During the Vietnam Conflict, 1965-1968, 16 September 1969.

¹⁵Ogden Air Materiel Area, Briefing to the Joint Logistics Review Board Ammunition Team, 29 July 1969.

AMMUNITION

(b) The magnitude of the ammunition storage problem in Vietnam can best be illustrated by the stockage objectives established by the Services during the peak buildup of U.S. forces. The ammunition stockage levels required on the ground in-country were 1. Army—295,000 tons, 2. Air Force—59,000 tons, and 3. Marine Corps—56,000 tons. The total stockage objective of 410,000 tons included neither Navy requirements nor the large quantities of suspended and unserviceable ammunition that required storage space on a continuing basis. It also did not include the fact that the stockage objective was often exceeded by the Services. For example, in January 1969, the Marine Corps had in excess of 89,000 STON on the ground in Vietnam. Adequate real estate to properly store this unprecedented quantity of ammunition in accordance with established quantity-distance safety criteria simply was not available.

(c) Because of the extreme difficulty in obtaining adequate real estate to store ammunition, a modular concept of storage that had been developed by the Air Force was approved by COMUSMACV for use in the combat zone by all Services. In the storage application used in Vietnam, a module was comprised of a maximum of five cells, each separated by barricades. Each cell had a capacity of 200,000 pounds of mass detonating explosives (the quantity contained in 518 M117 or 1041 MK 82 bombs). This allowed the storage of up to 1,000,000 pounds of explosive in a single contiguous module, while separate revetments were limited to 250,000 pounds each. This resulted in decreased land requirements and reduced the problem of maintaining the proper distances between the explosive storage areas and outside exposures such as inhabited buildings or petroleum, oil and lubricants (POL) storage. The reduction of required space also reduced requirements for roads, fencing and utilities.¹⁶

(d) Although the modular ammunition storage system provided a savings in space and critical real estate, it greatly concentrated large quantities of ammunition within a small area and consequently induced a greater explosive hazard. Space, though critical in the defense of a cantonment area or base camp complex, should not be the only consideration. The loss of several Ammunition Supply Points due to fire and enemy action justifies the need to find a better and standardized method of storing ammunition in a combat zone. The consequence of storing large quantities of ammunition within a small area in the module system was well illustrated on 27 April 1969 when the Ammunition Supply Point at Da Nang lost approximately 39,170 tons of ammunition valued at \$96,402,000.

(2) Physical Layout of Storage Facilities

(a) Many of the ammunition storage problems encountered during the Vietnam conflict can be attributed to the improper layout of storage areas during the initial buildup. During the early months of the buildup ammunition was pushed into Vietnam without sufficient trained personnel to properly handle it. As a result, ships were offloaded and the ammunition placed on the ground wherever space could be found, with little or no consideration given to storage criteria or safety. Ammunition storage sites were selected based on the tactical situation at the time. These locations, which in most cases were in close proximity to offloading ports or airfields, quickly became "locked in" and were later the only real estate available for ammunition storage with no room for expansion as the buildup progressed.

(b) The chaotic condition that existed at the ASP located adjacent to the Tan Son Nhut Air Base is a significant example of improper layout of ammunition storage facilities. The ASP was flanked on one side by an Air Force napalm mixing operation, on another by three POL dumps and on the third by primary runways of the airfield, all major safety and quantity-distance violations. In addition, this ASP was capable, under ammunition storage regulations, of holding 1,500 tons of ammunition. There was 9,000 tons stored in this ASP as of September 1965. Similar ammunition storage conditions existed in other areas throughout the tactical zone of operation.¹⁷

¹⁶Air Force Manual 127-100, Explosives Safety Manual. Change I, 12 June 1968.

¹⁷Mr. J. Zengerle, Dir. Material Readiness and Support Services, OASA(I&L) Report, subject: Report of The DA Team Visit to Vietnam Concerning Ammunition, 29 October 1965.

AMMUNITION

(c) The physical layout of an ammunition storage installation is directly related to the enemy threat and corresponding defense plan. Defense plans and the availability of security personnel may preclude maximum dispersion; however, a carefully developed physical layout will prevent or minimize a loss in the event of an enemy attack or if fire should occur. There were many examples in Vietnam where the layout of ammunition storage installations were influenced more by normal CONUS considerations, such as physical barriers to prevent damage to inhabited areas, than by the minimizing of tactical advantage to the enemy in the form of control of adjacent high ground. The ammunition storage depot at Qui Nhon, which was located in a bowl surrounded by mountain ranges on three sides, is a prime example of improper layout of an ammunition storage facility from the standpoint of security considerations. This was clearly brought out by the number of times this storage facility was hit by enemy sapper, mortar, and rocket attacks.

(3) Security

(a) Local security of ammunition storage installations in the Vietnam environment received almost as much attention as the mission area itself. In particular, ammunition units, as a matter of necessity, assumed the "lion's share" of the workload required to secure stocks at base depots and ASP locations. Within Logistical Support Areas (support facilities of permanence), the security requirements were not as acute as at depots and ASPs owing to their physical size. Nevertheless, the security problem was a continuous one as evidenced by Table C-4, which reflects ammunition losses from 1965 to 1969.

(b) Logistic installations in the guerrilla environment where there were no fixed front lines proved to be vulnerable to attacks by sapper action as well as to indirect fire. Ammunition storage installations were particularly vulnerable to both types of attacks. Since indirect fire was responsible for approximately 50 percent of the dollar value of ammunition lost, it appears that overhead protection for permanent or semipermanent installations should be considered. It is pointed out that the established criteria for military construction in the Republic of Vietnam authorized only 20 percent covered storage for air and ground munitions.¹⁸ This is false economy when one considers the cost of ammunition losses as the result of its being exposed to extreme environmental conditions and enemy action. The cost of providing 100 percent covered storage would have been more than offset by any one of the major losses reflected in Table C-4.

(4) Unserviceable Ammunition. The large quantity of unserviceable ammunition accumulated in Vietnam further compounded the storage problem as it occupied critical space and required extensive care in handling and storage owing to its hazardous condition. Because of the severe environmental conditions prevalent throughout Vietnam, ammunition in open storage deteriorated in a relatively short time to a point where it became unserviceable. Disposition of unserviceable ammunition was a time-consuming process, which was never fully resolved. Large quantities of unserviceable ammunition was still occupying critical storage space in Vietnam as late as 1969. The Army, faced with the problem of inadequate ammunition renovation units and facilities in-country, shipped most of its unserviceable ammunition to Okinawa for renovation. This proved to be a slow process, in that shipping requirements for the back-loading of unserviceable ammunition was given a low priority. Although the Marine Corps had no organic ammunition renovation capability, support was provided by a Navy Mobile Ammunition Evaluation and Renovation Unit (MAERU). The MAERU performed outstanding and creditable service in the renovation of unserviceable assets. However, owing to the number of personnel in the unit, its capability was limited and it could not renovate the large quantities of unserviceable ammunition generated. Unserviceable ammunition beyond the capacity of the MAERU was back-loaded to Sasebo, Japan, for renovation.

(5) Automatic "Push" Package

(a) Another factor which contributed to the ammunition storage problem in Vietnam was the automatic "push" package concept. Many of the contingency support stocks in

¹⁸MACV, Construction Directive 415-1-10, 24 May 1968.

AMMUNITION

the Army Operations Plans, SE Asia, Marine Corps STORM plans, which were pushed into Vietnam to maintain a level of ammunition until requisitioning was established contained items for which there was little or no demand, such as 3.5" antitank rockets, 90mm armor piercing ammunition, antitank mines and armor piercing bombs. As the result of the automatic "push" package concept, large quantities of unneeded types of ammunition deteriorated in open storage under severe environmental conditions and had to be destroyed by dumping at sea or retrograded out of country for complete renovation.

(b) Some manner of selectivity should be provided in the shipment of automatic resupplies of ammunition. The 90mm antitank ammunition mentioned above is a good example. Thousands of rounds of this ammunition were included in the mount-out and automatic resupply stocks. At the time of commitment to Vietnam, the probability of encountering enemy armor was very remote, yet the ammunition was brought in-country. In late 1967, this ammunition was still at the ASPs. The packaging had completely deteriorated and when any attempt was made to move the ammunition, it would fall out of what was left of the original packaging. The ammunition was finally declared unserviceable and destroyed.

(6) Inventory in Motion Concept. Owing to the limitation on secure ammunition storage areas and losses due to enemy action, intensive management and control procedures became necessary to reduce the amount of ammunition on the ground in Vietnam. One significant example was the inventory in motion concept adopted by the U.S. Army in 1968. Basically, the concept was designed to reduce the large inventory in Vietnam. Resupply under this concept recognized that the entire stockage objective need not be maintained on the ground. This concept placed the safety level on the ground, plus a portion of the operating level, with the remainder of stocks flowing from the pipeline at such a rate that on the ground tonnage was maintained at a minimum established management level. The effectiveness of the inventory in motion concept in reducing the amount of ammunition on the ground in Vietnam was identified by Major General Joseph M. Heiser, Jr., Commanding General, 1st Logistical Command (August 68-69), when he stated:

"In the fall of 1968 we had a stockage objective of approximately 280,000 short tons of ammunition with almost all of it on the ground in Vietnam, in overcrowded locations, making tremendously attractive targets for the enemy. Through command management action and depending on a knowledge of 'Inventory in Motion' this tonnage on hand (and the stockage objective) has been reduced to approximately half of what it was several months ago. A specific lesson learned in the value of this practice occurred on 22-23 February 1969 at Qui Nhon when we lost 9,000 tons of ammunition due to enemy action. The facts are that, in October there were 55,000 short tons stored at Qui Nhon which, had it not been for the application of the logistics principle covered above, would have been lost in total due to crowded conditions instead of the 9,000 tons which represented only half of the remainder."¹⁹

d. Packaging, Palleting, Handling Equipment

(1) Palletization of Ammunition. The increased use of palletization was most beneficial in the handling and storage of ammunition during the Vietnam conflict. It was common practice for ammunition to remain palletized from the vessel offload until it was issued to the firing unit. This saving in handling time resulted in better service to the units and an increased ability to handle peak issues of heavy bombs, rockets, artillery, and ship gun ammunition. Conversely, palletization resulted in an increased reliance on MHE. There were shortages of suitable cranes, forklifts, and similar ammunition MHE during the Vietnam conflict. This was especially true during the initial buildup. The unprecedented tonnage of ammunition (approximately 98 percent palletized) received and issued by the ASPs and depots created a requirement for operations 24 hours a day, seven days a week. Equipment, therefore, could be deadlined for only the briefest periods of mandatory maintenance. Maintenance was further complicated by the Vietnam environment and shortage of trained operators, maintenance personnel and spare parts.

¹⁹Maj. Gen. Heiser, CG, 1st Logistical Command, Department of Army, Letter AVCA-CG to Gen. Frank S. Besson, Jr., 20 March 1969.

AMMUNITION

(2) Ammunition Containers. Ammunition containers, particularly those for mortar ammunition, had an extremely short life because of the adverse environmental conditions prevalent throughout Vietnam. Outer containers must be capable of being exposed to high heat, humidity, and excessive rainfall without deteriorating to the extent that moisture can come in contact with the ignition system. Ammunition containers packaged in the present configuration will deteriorate in a relatively short time with 6 months to a year considered the maximum permissible storage life in an environment such as Vietnam. Beyond this period, deterioration is rapid. The wire-bound crate used extensively as an outer pack in Vietnam is a prime example of a container with a lack of structural strength. Ammunition deterioration as the result of inadequate pack was the most significant cause of malfunctions and prematures that caused unacceptable casualty rates during the Vietnam conflict.

(3) Metal Pallets and Containers. Because of the need for structural strength and the requirement for reducing fire hazard aboard ship, Navy air munitions were shipped in most cases on metal pallets or in metal containers. Cost of these metal pallets and containers made them accountable items subject to retrograde for re-use. This involved additional time, increased collision potential and safety of major ships, increased crew fatigue, wear and tear on handling equipment, and slowing down underway replenishment operations. As the Marine Corps also utilized Navy air munitions, they in turn experienced problems in the retrograde of metal pallets and containers. A good example was the situation at Chu Lai. During the period of time from initial deployment to Vietnam until the summer of 1968, the quantity of returnable metal bomb pallets, bomb fin crates, and dispenser munition containers accumulated at the Chu Lai Air Base was estimated to be 103,964 MTON valued at approximately \$14 million. A similar retrograde problem existed at Da Nang.²⁰

(4) Ammunition Movement. At the outset of the Vietnam conflict and continuing as late as 1969, there was a shortage of MHE. The lack of adequate quantities of MHE was one of the major bottlenecks in ammunition movement in 1966 and 1967. The equipment (gas operated, diesel operated, or electric operated) was not designed for loading palletized ammunition into magazines, shipholds, and other close handling spaces safely.

(5) Ammunition Packaging and Handling. There is a need to improve packaging and handling to minimize the retrograde materiel per round to provide service to the Fleet and Marine Corps air units ashore. Metal pallets, pallet adapters, containers, powder tanks, and unit packages created the following problems and considerations: (a) cost effectiveness considerations required re-use; (b) underway replenishment time was increased by return of retrograde material; (c) disposal at sea of material that floated produced seaway clutter and telltales of fleet location while materiel that sank produced concentrations of sunken metal; (d) pallet size was limited by the maximum underway replenishment load of 4000 pounds; and (e) palletizing was necessary for volume movement.

3. SUPPORT OPERATIONS

a. Personnel

(1) The Vietnam War, unlike previous wars, was fought without extensive use of reserve forces. This placed an unusual strain on the active forces in many areas. One of the significant areas was in ammunition support. This was particularly true for the Army, which placed heavy reliance on reserve ammunition support units.

(2) In all Services, the DOD civilianization program proved to be detrimental to the requirement for the military to develop a wartime sustaining base of ammunition officers and noncommissioned officers with storage, maintenance, supply operations, and depot level skills. It is difficult to justify in peacetime the requirement for ammunition support units that do not contribute directly to the immediate support of forces. Consequently, the employment of civilians, in lieu of military, in noncombat positions became widespread. This was especially true

²⁰COMNAVAIRSYSCOM, Letter AIR-41245H:SL, 17 February 1969.

AMMUNITION

at Ammunition Inventory Control Points, Ammunition Magazines, and Storage Depots. This policy greatly reduced the opportunity for military personnel to acquire the broad experience in ammunition management and control functions that was to be needed in Vietnam.

(3) Security measures for the protection of ammunition storage facilities were taken as routine precautionary measures during the World Wars and in Korea, but they were an absolute necessity in Vietnam because of the guerrilla activity of the enemy. To defend against the frequent guerrilla and mortar attacks, extensive perimeter defenses were constructed and ammunition support personnel, to an extent far greater than previously experienced, were required to man those defenses to the detriment of their primary mission.

b. Organization and Concept of Employment

(1) General. The actual organization and concept of employment for ammunition support units in conventional (nonnuclear) warfare as it existed in Vietnam from 1965 to 1969 cannot be defined in simple terms or schematically portrayed. Each Service had different organizational structures and concepts of employing ammunition units. The number of personnel spaces available to the Services as a whole, and to the commander in the theater, influenced the number of ammunition units in the active force, the number of personnel assigned to each unit and the organization's ability to provide effective and responsive ammunition support. The following paragraphs will assess the availability and effectiveness of ammunition personnel during the Vietnam conflict and will highlight the inherent strengths and weaknesses.

(2) Army

(a) The U.S. Army ammunition organization structure and support concept during the Vietnam conflict was not in accordance with the Combat Support to the Theater Army (COSTAR) doctrine, which set forth ammunition as an Army-wide service under the command and control of commodity-oriented personnel. In lieu of this, ammunition support by area under one logistic command was adopted. The area support concept functioned well in Vietnam, but for ammunition it initially had one glaring weakness—command and control units trailed rather than accompanied or preceded operating units. As a result, there were insufficient personnel of the requisite grade, knowledge, and skill at the staff and operating levels to accomplish ammunition support management transactions and storage, site selection, and planning.²¹

(b) In evaluating Army ammunition support operations it is noted that two ammunition supply detachments arrived in the Republic of Vietnam in May 1965. Each detachment, by Table of Organization and Equipment (TOE), had the capability to lift 150 STON per 24-hour period and was allocated based on each 150 STON of ammunition to be lifted. Records were not available to indicate daily or monthly lift accomplished by these units. However, it is germane to note the ammunition detachment TOE did not authorize MHE, such as forklifts and cranes. Although not indicated in the TOE, this type of unit is generally employed to augment the TOE 9-17 ammunition company. Further evaluation of ammunition unit deployment to Vietnam shows that as of August 1965 there were four ammunition supply detachments, one ammunition company, and one ammunition stock control detachment. These units by necessity had to establish an ammunition base as well as provide support to a one division force. With the arrival of the 1st Cavalry Division (Airmobile) in September 1965, three additional ammunition companies arrived, yet no ammunition command and control unit (battalion headquarters) existed. In fact, all ammunition companies arrived before the first battalion headquarters and headquarters company arrived in November 1965, by which time the supported force had reached two and two-thirds division equivalents. This situation was checked in early 1966 through the establishment of a separate staff section at the 1st Logistical Command and subsequently separate staff sections at each of the support commands.

²¹Mr. J. Zengerle, Dir. Material Readiness and Support Services, OASA (I&L) Report, subject: Report of the DA Team Visit to Vietnam Concerning Ammunition, 29 October 1965; 1st Logistical Command, Briefing for JLRB Ammunition Team, 13 August 1969.

AMMUNITION

(3) Navy. The Navy, like the other Services, experienced a shortage of qualified ammunition personnel during the Vietnam conflict. Throughout the Navy, there was a shortage of experienced ammunition supervisory personnel. The shortage stemmed from a ceiling on the overall petty officer complement of the Navy in some instances, and in certain ratings, from such factors as the time necessary for growth in petty officer strengths after requirements were increased and the low rate of retention of first-term personnel.

(4) Marine Corps

(a) The deployment of Marine Forces in Vietnam in sustained land operations presented a major problem for both ammunition logistic and support operations. Organized and equipped for the amphibious assault role, the Fleet Marine Force (FMF) possessed neither the trained ammunition personnel nor special handling equipment necessary to effectively support a land campaign of several years duration and one in which the consumption of ammunition was unequalled.

(b) The Marine Corps was faced with the unplanned requirement to provide ammunition resupply and perform ammunition depot functions with essentially the same support force. The ammunition company organization employed during the Korean conflict provided support for one division as compared to the requirement in Vietnam to support the two divisions, one aircraft wing, and a Republic of Korea brigade in I CTZ.

(c) The ammunition company organic to the Force Service Regiment, Force Logistic Command, plus the two ammunition platoons organic to the Marine division service battalions but reassigned to the Force Logistic Command in Vietnam were adequate to provide necessary support for 3d Marine Amphibious Force (III MAF) tactical operations in I CTZ but were not adequate to properly operate the large semipermanent Ammunition Supply Points (ASPs) located at Da Nang, Chu Lai, Phu Bai, and Dong Ha. By tonnage standards, ASP #1 and ASP #2 located at Da Nang, with a waived capacity of 50,000 and 35,000 tons respectively, were classified as ammunition depots. The tonnage handled by the ammunition company rose to over 80,000 STON monthly by early 1968.

(d) Faced with the problem of personnel shortages and insufficient handling equipment, priority was given to meeting operational requirements of 24 hours a day, 7 days a week, and as a result essential warehousing, maintenance and housekeeping requirements that are conducive to efficiency and safety were too often neglected.

(5) Air Force

(a) From 1965 to 1967 significant problems were encountered in providing trained personnel in almost all Air Force munitions specialties. Basic to these problems were the sharp increases in manning necessary to support operations in SE Asia and the simultaneous requirement to maintain worldwide operations, a shift in emphasis from nuclear weapons to conventional munitions, an increase in quantities and types of conventional munitions, the complexity of the weapon mix and weapon system configurations actively employed in SE Asia operations, and the increased safety hazards associated with operations and conditions in SE Asia. The primary Air Force munitions specialties involved were munition specialists, weapons mechanics, explosive ordnance disposal (EOD) technicians, and aerospace munition officers.

(b) Because emphasis was shifted to conventional munitions, additional training was required for personnel already assigned in these critical specialties and a sharp increase was needed in the output from basic training courses to keep pace with increased manning authorizations. In addition, the increased number of tactical (as opposed to strategic and defensive) aircraft organizations created a need for training to orient personnel to tactical weapons systems. Personnel with Strategic Air Command (SAC) or Aerospace Defense Command (ADC) backgrounds could not be used immediately to support tactical weapons system operations. Further, there was a requirement to provide SE Asia organizations with personnel who were adequately trained to assume their duties with a minimum amount of additional training by

AMMUNITION

PACAF activities. The short (1 year or less) tour, critical status of trained instructors and training aircraft, lack of training facilities, and other related aspects posed serious problems.

(c) Air Force munitions storage, handling and maintenance were performed by personnel of a munitions maintenance squadron (MMS), an organic organization of each tactical fighter wing. Standard manning was authorized an MMS for overhead functions, related to the number of tactical squadrons supported, the quantity of munitions in the 45 day stockage objective, and the sortie rate of the supported units. This obviously created a vast difference in manpower authorization for an MMS at a CONUS training base versus an overseas combat base. Further, as has been noted in previous chapters, the Air Force had no CONUS depot structure, but relied on use of Army facilities for storage of reserve stocks. These factors resulted in a lack of a manpower pool of trained munitions handling and storage specialists.

(d) As the war in Vietnam expanded, the total Air Force requirements for munitions handlers almost doubled. The training base was quickly expanded, but it was also necessary to cross-train large numbers of career airmen and noncommissioned officers from other career fields. This caused a reduction in skill level in the supervisory grades, with a resultant decrease in unit effectiveness.

(e) Load crews were not part of the MMS, but were assigned directly to the tactical squadrons for mobility purposes. Although requirements in this skill also expanded, a significant base of trained personnel existed at both training units and in the Strategic Air Command. Retraining from one type of aircraft to another was required, but this was relatively easy to accomplish.

(f) Problems also existed with officer personnel. The majority of officers in the aerospace munitions career field had never been trained in conventional munitions nor had any field experience in their handling. This resulted in the establishment of a 4-week course of training—The Conventional Munitions Refresher Course—which was required for all munitions officers prior to assignment to SE Asia.

4. CONCLUSIONS AND RECOMMENDATIONS

a. Conclusions

(1) During the early buildup, ammunition ships encountered continuous delay in discharging in Vietnam owing to inadequate port facilities and the large number of ships involved (paragraph 2a(3)).

(2) The special procedure invoked by the Air Force to overcome lack of storage facilities in Vietnam (SPECIAL EXPRESS), while contributing to the port congestion problem, was warranted and effective (paragraph 2a(6)(d)).

(3) Planning at the start of the Vietnam buildup did not recognize the rapid expansion that would be required at ammunition outloading ports. This was a particularly severe problem at Naval Weapons Station, Concord (paragraph 2a(2)).

(4) The Department of Defense policy of utilizing those ports which minimized total transportation cost resulted in a migration of munitions outloading from the west coast to the east coast as sufficient assets became available to fill the longer pipeline involved. This resulted in an reduction in west coast port capability to respond to unforeseen contingencies (paragraph 2a(2)).

(5) The containerization concept is an important key to marked improvement in the future supply of ammunition to theaters of operation (paragraph 2a(6)(a)).

(6) Adequate storage for ammunition in Vietnam was hampered by lack of available real estate, terrain, construction priority allocations, and improper logistics facility layout and was further constrained overall by security considerations (paragraphs 2b(1), 2b(2), and 2b(3)).

AMMUNITION

(7) The problem of inadequate storage facilities for ground munitions was compounded by the large stockage objective required to offset instabilities in the pipeline (paragraph 2b(1)).

(8) As the intensity of conflict and the pipeline stabilized, the large stockage objectives in Vietnam were reduced by management techniques such as the inventory in motion concept (paragraph 2b(6)).

(9) Problems associated with renovation and retrograde of unserviceable ammunition existed as late as 1969 (paragraph 2b(4)).

(10) In Vietnam, enemy actions and accidents caused documented losses of ammunition valued at over \$185 million, and extensive damage was done to surrounding facilities by the resultant explosions and fires. In addition costly damage to U.S. facilities and loss of ammunition resulted from explosions at Vietnamese ammunition storage sites (paragraph 2b(3)).

(11) The existing ammunition storage and safety criteria are adequate for peacetime use, but not under the security requirements and real estate limitations prevalent in a combat zone. There is an urgent need to establish easily interpreted risk probability tables for use when combat area restraints preclude optimum storage (paragraphs 2b(2) and 2b(3)).

(12) The peculiarities of the environment of a combat area have a major impact on the effectiveness of ammunition packaging, palletizing, and handling equipment. Substantial changes in these were found necessary during the Vietnam conflict (paragraphs 2c(1), 2c(2), 2c(3), 2c(4), and 2c(5)).

(13) The organization and personnel resources to perform ammunition support functions that existed prior to 1 January 1965 did not provide a fully adequate base on which to later expand ammunition support operations (paragraph 3a).

(14) Civilian-oriented ammunition support systems that had evolved by 1965 adversely affected the readiness of the Services to provide military personnel with the broad experience in ammunition management and control function needed in Vietnam (paragraph 3a).

(15) The emphasis of nuclear weapons prior to 1965, particularly by the Air Force, contributed to the shortage of conventional munition specialists (paragraph 3a(4)).

b. Recommendations. The Board recommends that:

(1) The military departments maintain the current ammunition outloading facilities on both the east and the west coasts adequate for planned contingencies, giving continued emphasis to the maintenance of adequate explosive safety zones at existing ammunition outloading ports (AM-15) (conclusions (3) and (4)).

(2) The Services vigorously pursue existing programs and projects for the development of containerization systems and related concepts for the delivery of ammunition to a theater of operations, including containership discharge in the stream (AM-16) (conclusion (5)).

(3) The Services, through the Joint Logistic Commanders and in coordination with the Armed Services Explosive Safety Board, develop specific criteria for the storage of all types of air and ground munitions in a combat zone. These criteria would guide the commanders in establishing construction standards for ammunition facilities (including covered storage) and should include quantity-distance risk probabilities for use in arriving at decisions on waivers (AM-17) (conclusion (11)).

(4) The levels of ammunition stored in a combat zone be controlled by the commanders concerned to minimize the amounts stored and still provide a reasonable level to accommodate fluctuations in the pipeline or combat emergencies. The Army's recently adopted inventory in motion is such a concept (AM-18) (conclusion (8)).

AMMUNITION

(5) The Services maintain a viable career program with supporting training base to identify a cadre of ammunition logistic personnel of requisite grades and skills to ensure the availability of ammunition logistic support personnel in accordance with contingency plans (AM-10) (conclusions (13), (14), and (15)).

CHAPTER VII
SUMMARY

CHAPTER VII SUMMARY

1. OVERVIEW

a. Ammunition expenditures grew to unprecedented levels during the Vietnam conflict. This was partly due to the nature of the war itself, with combat actions not only scattered throughout the Republic of Vietnam but also extended to interdiction of the lines of supply in North Vietnam and Laos. The extraordinary increase in expenditure of air munitions over any previous experience stemmed from the employment of modern high performance aircraft capable of delivering large quantities of munitions at high sortie rates. It is to the credit of the ammunition logistic systems that these high requirements were so well met, particularly in view of difficulties associated with frequent periods of marginal asset positions of many types of ammunition during the Vietnam conflict.

b. At the start of the buildup, the quantity of assets on hand in relationship to approved inventory objectives appeared to be relatively favorable for most categories. However, this was somewhat misleading for several reasons:

(1) Only the Army was authorized D-to-P stocks—the amount required to sustain operations from the onset of hostilities to the time when production equalled consumption—however, this complete authorization was never funded.

(2) Large percentages of the assets were obsolescent munitions left over from the Korean War. This was particularly true for bombs, in which a very low percentage were the streamlined bombs desired for external carriage by jet aircraft.

(3) Military planners did not envision the delivery of conventional bombs by B-52s in large-scale, sustained operations.

(4) In some cases requirements forecasting based on the experience of previous wars resulted in low estimates. A particular case in point is naval gunfire, in which the munition expenditures far exceeded any previous estimates.

c. The ammunition production base had declined significantly since the Korean War and difficulties were encountered in its activation and augmentation. Contributing factors were inadequate technical data packages, the step-by-step decisions based on deployment of forces, and the poor overall conditions of plant equipment. A further complication was that mobilization agreements that had been negotiated with private industry proved mainly ineffectual in that no national mobilization was enforced for the Vietnam conflict.

d. A number of other factors combined to complicate the marginal asset situation. One was the escalation of the war effort and a strategy of graduated military actions that, combined with the inherent time lags of production and transportation, often kept the supply of ammunition well behind the power curve. Another was the large fluctuation in ammunition expenditures. Expenditures of air munitions varied as the result of weather, enemy action, and targeting, but in an overall sense were relatively stable. Expenditures of some types of ground and ship gun ammunition were marked by wide variations. A third factor was the peacetime fiscal policy of minimizing near-term expenditures with lesser emphasis on long-term implications. A fourth stemmed from a concern over the possibilities of excesses at the end of the war. Constraining production programs essentially to combat and training expenditures, even in cases where worldwide stocks were well below objectives, provided little cushioning against surges and emergencies.

AMMUNITION

e. No major operations were canceled. The required degree of support of these operations was achieved through intensive management of ammunition within the Services, use of expenditure controls in critical situations, and transfer of assets between the Services as directed by the unified commander in cases of serious short supply. Notwithstanding these actions there were prolonged periods in which expenditures of certain types of ammunition were asset limited, and during the spring of 1966 a number of air sorties in Vietnam were suspended. It was necessary, at times, to utilize premium air shipments and to take other extraordinary actions to ensure the availability of the required munitions. In some instances, substantive transfers of ammunition from other forces and other areas of the world were necessary, with accompanying degradation of readiness in these areas.

f. The marginal asset situation, fluctuations in expenditures, and frequent changes in inventory objectives resulted in unusually detailed control of production schedules at high levels in the Department of Defense and frequent, sometimes costly, changes in production rates.

g. At the start of the buildup, the peacetime ammunition information systems were inadequate for modern wartime needs. All the Services developed systems well suited to the management of ammunition under dynamic conditions of warfare. This greatly facilitated sound management and command decisions.

h. The preceding paragraphs have provided a brief overview of the ammunition situation as it developed in the Vietnam era. The detailed review in this monograph focused attention on four primary topic areas for in-depth analysis:

- (1) Ammunition support during the Vietnam conflict
- (2) Generation and control of ammunition programs
- (3) Procurement and production of munitions
- (4) Pacific theater distribution and support operations.

The major lessons learned and the more significant recommendations are grouped under these headings.

2. AMMUNITION SUPPORT DURING THE VIETNAM CONFLICT

a. Lessons Learned

(1) The experience during the Vietnam era, as in other wars, has clearly demonstrated that ammunition requires constant command attention and specialized management by technically qualified officers closely coupled with operations and operational planning, and further that special attention is required to keep ammunition logistic systems in readiness for immediate response to contingency requirements.

(2) Although continuing adjustments to the flow of ammunition to the combat area are required, taking into account actual expenditures and trends, allowances must be made for major fluctuations in ammunition expenditures under dynamic warfare conditions. The inventory objectives in the theater of operations and in CONUS should be sufficiently high to provide for such fluctuations and for emergencies. Adequate allowance for surges in expenditure and stable worldwide inventory objectives are required for sound and economical management, thereby minimizing the need for uneconomical measures such as premium transportation, inefficient variations in production, and transfers from other areas of the world.

b. Recommendations

(i) Commanders with ammunition logistic responsibility in time of war retain a nucleus staff capability in peace and the Services plan to augment key staffs with qualified ammunition logisticians promptly at the start of a contingency (AM-4).

AMMUNITION

(2) In addition to a normal pipeline to replenish actual ammunition expenditures, the Services be authorized to maintain a level of national assets in support of combat sufficient to respond to emergencies and surges (AM-1).

3. GENERATION AND CONTROL OF AMMUNITION PROGRAMS

a. Lessons Learned

(1) Experience during the Vietnam era reaffirmed the validity of the D-to-P concept, whereby inventory levels are based on the quantities required to sustain operations from the onset of hostilities to the time when production equals consumption.

(2) All the Services developed sound procedures to determine ammunition requirements to support the Vietnam conflict. These procedures should be continually updated with full recognition of the fact that experience has not been gained with certain types of ammunition, other warfare situations, and different types of usages.

(3) When program guidance was changed as a result of budgetary considerations, valid requirements often tended to become confused with the authorized inventory objectives at the time. The confusion of valid requirements with authorized inventory objectives is dangerous with respect to the evaluation of acceptable risks and has adverse effects on long-range program planning.

(4) All the Services developed effective ammunition reporting systems well adapted to fulfilling the needs of command and management under conditions of dynamic warfare. In a peacetime environment, special steps will be required to ensure the continuing readiness of these systems.

b. Recommendations

(1) When the Services have established what they consider to be valid requirements for ammunition inventory objectives, care be taken that these continue to be identified as requirements regardless of program and budget decisions (AM-6).

4. PROCUREMENT AND PRODUCTION OF MUNITIONS

a. Lessons Learned

(1) The Vietnam experience emphasizes the importance of maintaining an adequate production base, developed and maintained in consonance with the D-to-P concept. An adequate production base related to the D-to-P concept is especially critical for ammunition, as the production of ammunition requires facilities and processes in many respects unique and greatly different from normal domestic manufacturing processes.

(2) Unless emergency actions are taken at the national level, mobilization agreements with private industry are relatively ineffectual. Thus, lacking mobilization, extraordinary steps must be taken to activate and augment ammunition production promptly at the start of an emergency.

(3) Increasing the Service Secretarial approval authority from the \$1 million level currently authorized in Department of Defense Directive 4275.5 to \$5 million would have permitted the Secretary of the Army to approve 88 percent of the number of facilities projects initiated during FY 66 through FY 69, while retaining at the Secretary of Defense level the approval authority of 62 percent of the dollars.

(4) Peacetime administrative controls were continued and in some instances tightened. Peacetime procedures were too time consuming to be responsive to the exigencies of the wartime situation and forced munitions procurement agencies to adopt shortcut procedures such as the extensive use of letter contracts, option clauses, and noncompetitive procurements.

AMMUNITION

(5) The current assignments to the military departments of responsibilities for procurement and production of ammunition can be streamlined. For example, there does not appear to be any reason for the Army to be charged with production of bombs to be used only by the Air Force while the Navy is producing bombs that require closely related facilities.

b. Recommendations

(1) The approval authority of the Secretaries of the military departments for facilities projects pertinent to establishment or expansion of the production base, as set forth in Department of Defense Directive 4275.5, be increased from \$1 million to \$5 million (AM-12).

(2) In recognition of the absence of necessary lead time in war for awarding follow-on munitions contracts, the military departments identify those items to be procured from sole source producers. These items be exempted from mandatory competitive procurement during a contingency, with the understanding that competition will be introduced when the exigencies of the situation will permit (AM-9).

(3) The military departments initiate a joint review of ammunition procurement and production responsibilities for purposes of recommending changes to Department of Defense Instruction 4115.1, including adjustments in existing capability through transfer of facilities as required. Action be taken to consolidate general-purpose bomb responsibilities under the Navy, removing the Army from involvement in an item it does not employ. Other items that should be reviewed to determine the feasibility of single Service assignment are incendiary bombs, projectile fuzes, explosives, and small arms ammunition (AM-14).

5. PACIFIC THEATER DISTRIBUTION AND SUPPORT OPERATIONS

a. Lessons Learned

(1) The Vietnam conflict demonstrated the necessity for retaining current ammunition outloading ports on both the east and the west coasts capable of expanding to meet contingency operations. (A recommendation on modernization of all ports to include container handling facilities is contained in the Transportation Monograph, recommendation (TR-6).)

(2) The port congestion experienced in Vietnam created delays in delivery of ammunition and attendant explosive hazards. Significant advantages are to be gained from containerization of ammunition that is to be shipped to an overseas point. Furthermore, the trend is to utilize container ships for the vast majority of ocean transportation overseas. There is an urgent need to develop containerization concepts for ammunition and to provide suitable capabilities at both the outloading ports and the offloading points overseas.

(3) Special attention is needed to ensure the early provision of adequate storage for ammunition in a combat area. Instances of costly loss of ammunition and extensive damage to adjacent facilities highlight a requirement for more meaningful criteria for siting and layout of ammunition storage areas in a combat zone. Special safety criteria are required for ammunition storage to assist commanders in making tradeoff decisions concerning the probabilities of loss and damage due to enemy action.

(4) The lack of timely availability of a sufficient cadre of ammunition logistic personnel of requisite grades and skills to accompany the entry of combat forces into Vietnam seriously degraded overall in-country ammunition support during the early years of the conflict.

b. Recommendations

(1) The military departments maintain the current ammunition outloading facilities on both the east and the west coasts adequate for planned contingencies, giving continued emphasis to the maintenance of adequate explosive safety zones at existing ammunition outloading ports (AM-15).

AMMUNITION

(2) The Services vigorously pursue existing programs and projects for the development of containerization systems and related concepts for the delivery of ammunition to a theater of operations, including containership discharge in the stream (AM-16).

(3) The Services, through the Joint Logistics Commanders and in coordination with the Armed Services Explosive Safety Board, develop specific criteria for the storage of all types of air and ground munitions in a combat zone. These criteria would guide the commanders in establishing construction standards for ammunition facilities (including covered storage) and should include quantity-distance risk probabilities for use in arriving at decisions on waivers (AM-17).

(4) The Services maintain a viable career program with supporting training base to identify a cadre of ammunition logistic personnel of requisite grades and skills to ensure the availability of ammunition logistic support personnel in accordance with contingency plans (AM-19).

APPENDIX A
AIR MUNITIONS WEAPON AND WEAPONS
SYSTEM COMPATIBILITY

APPENDIX A

AIR MUNITIONS WEAPON AND WEAPONS SYSTEM COMPATIBILITY

1. INTRODUCTION

a. Air munitions shortages experienced in Vietnam during the early stages of the conflict, as detailed in Chapter III, were partially the result of weapon and weapons system compatibility problems. Munitions, including both end items and components, were frequently available at a given location but were not certified for carriage on the assigned aircraft. For example, certification would often be accomplished for only the most desirable fuzing arrangement, precluding use of available substitute fuzes. This problem was intensified when CINCPAC began the transfer of munitions between the Services in 1966, as there was often a lack of interchangeability between Navy and Air Force components.

b. Munitions logistic support capability in Vietnam was directly affected by the difficulties with weapon and weapons system compatibility. Appendix A will examine the basic reasons for the problem, together with the peripheral issue of munitions standardization.

2. COMPATIBILITY PROBLEMS

a. The initial difficulties with munitions compatibility were the result of the need to expend old types of munitions from modern aircraft. A large percentage of the total munitions stocks on hand at the start of the conflict in Vietnam were of World II vintage, designed for carriage by propeller-driven aircraft. Their widespread use on jet aircraft had not been envisioned, and in many cases the necessary testing to determine physical compatibility, speed and G-force limits, and release and separation characteristics had not been done. The munitions could not be used on that aircraft until the completion of testing for a specific munitions and aircraft combination, the issuance of applicable restrictions in pilot handbooks, and the establishment of loading procedures.

b. This basic difficulty was vastly compounded by the introduction of the Multiple Ejector Rack (MER) and Triple Ejector Rack (TER). The MER is a hexagonal beam on which six separate bomb racks are mounted. It is attached to an aircraft pylon—which normally carries only one external store—and allows carriage of six individually releasable stores. The TER is similar but has only three racks. On the F-4 aircraft, for example, MERs can be mounted on the two outboard wing pylons and on the fuselage centerline station, and TERs installed on the inboard wing pylons. This increases the aircraft's external stores capability from 5 to 24 bombs, as shown in Figure A-1. As certification is required for each individual type of weapon on each desired load position, the introduction of these racks greatly increased the demands for limited testing capability.

c. The Navy test and range facilities were adequate to meet these demands in a timely manner.¹ In the Air Force, however, a large backlog of certification requirements had developed by early 1966. To cope with the backlog, project SEEK EAGLE was established in 1966, at Headquarters, USAF, to control, direct, and supervise the total certification effort. Although actual responsibility for necessary testing rests with the Air Force Logistics Command (AFLC) for in-service aircraft and the Air Force Systems Command (AFSC) for in-production aircraft

¹CNO, Letter, OP411 Serial 1494P41, subject: Ammunition Logistics During Vietnamese War 1965-1969, 2 December 1969.

AMMUNITION

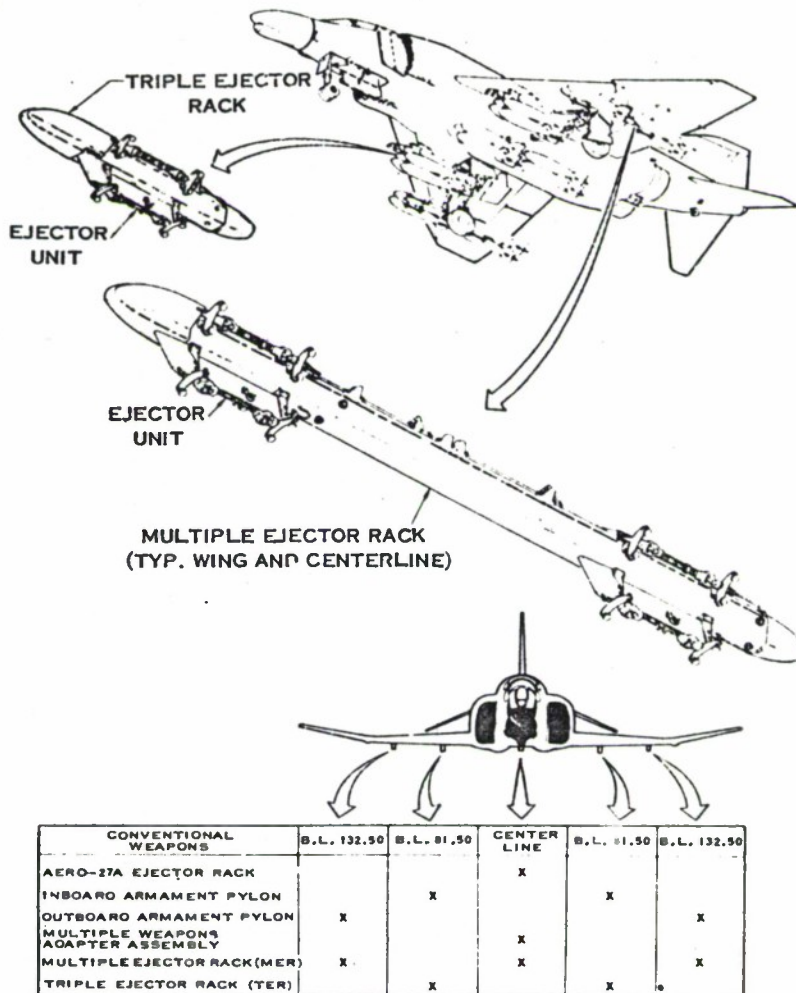


FIGURE A-1. MULTIPLE AND TRIPLE EJECTOR RACKS

Source: McDonnell Douglas Product Support Publication, Armament Systems of the F-4C, F-4D, and F-4E, 1 December 1967.

and all development munitions, project SEEK EAGLE provided an effective management tool for ensuring that certifications are accomplished in priority sequence as rapidly as possible.²

3. MUNITIONS STANDARDIZATION

a. At about the time that adequate certification of obsolescent munitions was accomplished, problems in munitions standardization began to appear. To provide optimum munitions for each type of aircraft and target, the number of different configuration for each type of munition increased greatly. Napalm bombs will serve as an example, although they did not present

²Hq. USAF (AFRDQ), Letter, subject: Munitions Logistics During the Vietnam Conflict 1965-1968, 29 December 1969.

AMMUNITION

the most severe problem. Table A-1 illustrates the types of napalm bombs that have been used in Vietnam and the general characteristics of each. Rationale exists for all these configurations. The M116A2, an early Army design, was not suitable for jet aircraft. As a result, the Navy and Air Force initiated separate development programs for families of napalm bombs compatible with high carriage and release speeds. The effort resulted in bombs in the 250-, 500-, 750-, and 1,000-pound weight classes to provide optimum loading of various types of aircraft. Finned napalm bombs were constructed for maximum effectiveness against targets located under tree canopies, whereas unfinned bombs were produced for use in open areas. Prefilled bombs, which greatly reduce the preparation-for-strike effort, were developed by the Air Force. Empty bombs, which decrease shipping costs and storage space requirements and are the only type safe for shipboard use, were designed by both Services.

TABLE A-1
NAPALM BOMBS USED IN VIETNAM

Nomenclature	Service	Weight Class	Shipment Configuration		Fins	
			Empty	Prefilled	No	Yes
M116A2	USAF	750	x		x	
BLU-1/B	USAF	750	x		x	x
BLU-10/B	USAF	250	x		x	
BLU-11/B	USAF	500	x		x	
BLU-23/B	USAF	500	x		x	x
BLU-27/B	USAF	750		x	x	x
BLU-32/B	USAF	500		x	x	x
MK 77 Mod 0	USN	750	x		x	x
MK 77 Mod 1/2/4	USN	500	x		x	
MK 78 Mod 2	USN	750	x		x	
MK 79 Mod 1	USN	1000	x			x

b. Notwithstanding this tailoring of munitions, a general preference existed to certify all available munitions on all aircraft to provide the greatest possible flexibility in operations. The SEEK EAGLE program in the Air Force and similar management techniques in the Navy kept this within reasonable bounds, but it still contributed to the saturation of existing test and range facilities.

c. By 1969, however, in recognition of both the logistic and operational problems presented by a multitude of similar bombs, both the Navy and the Air Force moved toward standardization. Procurement was limited to the BLU-27/B prefilled 750-pound and BLU-32/B prefilled 500-pound bombs for the Air Force and the MK 77 Mod 2/4 empty 500-pound bomb for the Navy.

d. Interservice standardization is an inherent part of this problem. It should be noted that none of the seven Air Force napalm bombs shown in Table A-1 have been certified on Navy aircraft, nor have the four Navy bombs been certified on Air Force aircraft. This situation precluded interservice transfer of these items in times of imbalanced stockage, as was frequently done with general-purpose bombs. Potential cost savings in the future may also be jeopardized if the possibilities of interservice standardization are not vigorously pursued. The Air Force

AMMUNITION

prefilled bombs, although highly satisfactory for use in Vietnam, have a limited shelf life and are subject to ignition problems at low temperatures. They are therefore unsuitable for use in worldwide War Readiness Materiel (WRM) stocks. Current Air Force policy is oriented toward new production of the BLU-1/B and BLU-23/B empty bombs when procurement to fill WRM requirements is again authorized, despite the suitability of the Navy MK 77 Mod 4 bomb for this use. The total problem of air munitions standardization, however, goes well beyond that of major end items.

e. The basic point to be made is well illustrated by the example of tail adapter-boosters, which are utilized in most general-purpose bombs. In 1969, the T46E5 tail adapter-booster, used for years by both the Navy and the Air Force, was redesignated the M146. Shortly thereafter, it was value-engineered and redesignated as the M147. The M147 did not have a hole in the backplate required for compatibility with the Navy MK 346 fuze. The Air Force would not agree to procure adapter-boosters with holes because it would increase the unit cost by 10 cents. As a result, the Navy initiated separate actions to obtain an adapter-booster with this hole, which was designated the XM150.^{3,4} Indications are that these decisions were made at a relatively low level within the Services. No evidence can be found that the total cost to the Department of Defense resulting from an additional data package, procurement action, cataloguing action, and line in inventory reports, or the operational impact, which will preclude future transfer of these items between the Services, was given adequate consideration. The higher echelons of Service staffs should have been involved in a decision with these significant implications.

f. The record is replete with other examples of nonstandardization of basically identical items. The Navy fills high explosive bombs with H-6, whereas the Air Force utilizes Tritonal. Each of the Services has developed its own family of bomb fuzes. Even when end items are identical, containers are frequently different, as in the AGM-12B BULLPUP and AGM-45 SHRIKE. No implication is made that these positions, repeatedly justified by the Services, were unsound, but the possibility that not all were vital to unique service requirements stimulated actions by the Office of the Secretary of Defense.

g. In November 1966, the Assistant Secretary of Defense (Installations and Logistics) (I&L) established a Department of Defense Steering Committee on Air Munitions Standardization, to "coordinate and stimulate interest in the standardization of air munitions and related components and recommend measures to standardize air munitions configurations."⁵ This committee was terminated on 10 February 1969. On this same date, the Department of Defense Air Munitions Requirements and Development Committee (AMRAD) was chartered under the Director of Defense Research and Engineering. Its purpose is to "furnish advice...for achieving design standardization during development for air munitions..."⁶ The committee is composed of a designated staff member from the Directorate of Defense Research and Engineering, who serves as chairman, and an appointed full time member from each of the four Services. The Assistant Secretary of Defense (I&L), Assistant Secretary of Defense (Systems Analysis) and the Director of the Joint Staff each designate one staff member to serve in an advisory capacity to the committee chairman. The Service members of the committee are in the rank of O-5 and O-6, and are authorized to act as spokesman for their Services in air munitions standardization matters.⁷ A revision to the AMRAD charter is expected to be published in the near future that will specify that service members be of O-6 rank.

h. Although the AMRAD committee has not been in existence for a sufficient period of time to clearly assess its impact on air munitions standardization, the fact that it is an advisory group without directive authority indicates that strong Service support is necessary if it is to be

³Ibid.

⁴CNO, Letter, Serial 1494P41, Enclosure 1, subject Air Munitions Nonstandardization and Weapon/Weapon System Compatibility, 2 December 1969.

⁵Assistant Secretary of Defense (I&L), Memorandum to the Service Assistant Secretaries for I&L, Establishment of the DOD Steering Committee on Air Munitions Standardization, 7 November 1966.

⁶Charter for AMRAD Committee, Attachment 1 to Director of Defense Research and Engineering Memorandum, Standardization of Air Munitions Configuration, 17 February 1969.

⁷Ibid.

AMMUNITION

effective. The pending revision to the AMRAD charter, specifying that Service members be of senior rank, will aid in ensuring that this support is afforded and optimum standardization of air munitions is obtained.

APPENDIX B

**MUNITIONS PROCUREMENT ORGANIZATION,
FUNCTIONS, AND CONTROLS**

APPENDIX B

MUNITIONS PROCUREMENT ORGANIZATION, FUNCTIONS, AND CONTROLS

1. **INTRODUCTION.** As indicated in Chapter V, munitions procurement and production for the four Services are accomplished by the Army, the Navy, and, to a limited degree, the Air Force. The organization, functions, and controls evident in the three munitions-procuring Services are dissimilar in many respects. This appendix will review those differences deemed to be significant. The review is oriented toward providing background for the reader rather than toward developing any conclusions or recommendations.

2. ORGANIZATION AND FUNCTIONS.

a. **General.** Although the Armed Services Procurement Regulations (ASPR) establish the basic parameters for military procurement, the Services are not identically organized to carry out this function. At the secretarial level, the Secretary is, by statute, designated as the head of an agency, as defined in Section 2302 (1) Title 10, U.S. Code. Each military department has an Assistant Secretary for Installations and Logistics (AS(I&L)), who is authorized to act for and with the authority of the Secretary in procurement matters. Each AS(I&L) has principal staff elements that act on procurement matters. The size and mission of this staff element within each Service varies to a very limited degree. Procurement authority as pertains to munitions acquisition flows from the AS(I&L) to commanders of major commands in each Service as follows: Army, direct to the Army Materiel Command; Navy, direct to the Naval Material Command; Air Force, through the Chief of Staff Air Force, who has a principal staff comprised of the Deputy Chief of Staff for Systems and Logistics and a subordinate Directorate of Procurement policy, to the Air Force Systems Command and the Air Force Logistics Command. These procurement organizations and functions for each of the military departments are as follows.

b. **Army Organization and Functions.** Within the Department of the Army, the Assistant Secretary of the Army for Installations and Logistics (ASA(I&L)) has a principal procurement staff consisting of the Directorate for Materiel Acquisition, the Directorate for Procurement Policy and Review, and the Army Small Business and Economic Utilization Policy Advisor. Procurement authority flows direct from the ASA(I&L) to the Commanding General of the Army Materiel Command (AMC), who is designated as the head of a procuring agency (HPA). The AMC, the Army's wholesale activity, is responsible for the management and execution of research, development, supply, and distribution of the Army's material needs. Within AMC, which is comprised of seven commodity commands and two functional commands, the Commanding General of the Munitions Command (MUCOM), also designated as an HPA, is responsible for the research, development, supply, and distribution of munitions to the Army. The U.S. Army Ammunition Procurement and Supply Agency (USAAPSA), a subordinate element of MUCOM, is assigned the missions of both the National Inventory Control Point and the National Maintenance Point for munitions. Included in their mission is the responsibility for procurement, production, distribution, reporting, requisitioning, storage, movement, maintenance, evacuation, and disposition of munitions. In essence, the total responsibility for munitions management is assigned to a single integrated command within the Army.

c. **Navy Organization and Functions.** Within the Department of the Navy, the Assistant Secretary of the Navy for Installations and Logistics (ASN(I&L)), acting for and with the authority of the Secretary of the Navy, has a principal procurement staff element consisting of the Directorate for Procurement. Included in this Directorate is the Special Assistant for Small Business and Economic Utilization, the Navy representative to the Armed Services Procurement Regulations Committee, and the Procurement Review staff. Procurement authority flows directly from the ASN(I&L) to the Chief of Naval Material Command, who is designated an HPA. The Naval

AMMUNITION

Material Command (NAVMAT) is responsible for providing the material support needs of the operating forces of the Navy, and of the Marine Corps for the support provided by the Navy.¹ Since April 1966 NAVMAT has been comprised of six Systems Commands. Insofar as procurement of munitions is concerned, two of the Systems Commands, Naval Air Systems Command (NAVAIRSYSCOM) and Naval Ordnance Systems Command (NAVORDSYSCOM), in conjunction with the Naval Supply Systems Command (NAVSUPSYSCOM), jointly share the responsibility for munitions management. The NAVAIRSYSCOM and NAVORDSYSCOM are responsible for mobilization planning, research and development, determination of requirements, and procurement and production of munitions—subject in some instances to the overall program coordination assigned to systems project managers (Antisubmarine Warfare, Surface-to-Air missiles) chartered by the Chief of Naval Material. Even though these responsibilities are assigned to the Systems Commands, the actual procurement and production of gun and some conventional air munitions (bombs and flares) are nominally managed by the Ammunition Division of the Ships Parts Control Center (SPCC), an element of NAVSUPSYSCOM. Also, in some instances, the Systems Commands initiate direct procurement of some munitions and subsequently pass the resultant contract to SPCC for administration. The successful coordination of this portion of munitions management within the Navy is in part attributable to the proximity of SPCC to Washington, D.C. The division of responsibility between the three Systems Commands and the Ships Parts Control Center, Mechanicsburg, Pennsylvania, complicates the procurement of munitions.

d. Air Force Organization and Functions. With the Department of the Air Force, the Assistant Secretary of the Air Force for Installations and Logistics (SAFIL) has a principal procurement staff consisting of the Deputy for Procurement. Procurement authority flows from the SAFIL to the Chief of Staff, USAF, whose principal procurement staff is the Director of Procurement Policy under the Deputy Chief of Staff, Systems and Logistics, thence to the Commanding Generals of the Air Force Logistics Command (AFLC) and the Air Force Systems Command (AFSC), each designated an HPA with unlimited authority. Both the AFLC and the AFSC are primarily responsible for central procurement for the Air Force. In essence, central procurement encompasses weapons systems, ancillary equipment, and bulk (or wholesale) logistic support, as opposed to base procurement, which relates to supplies and services required to operate a base. The procurement function of AFLC is decentralized in that this function is performed by the five Air Materiel Areas (AMAs), each assigned the responsibility for management of specified commodity categories. Munitions procurement falls within the category of central procurement and is essentially accomplished under the direction of AFLC by the cognizant AMA. Air-launched missile procurement is accomplished by the Warner-Robins AMA (WRAMA), whereas all other conventional munitions procurement is accomplished by the Ogden AMA (OOAMA). The functions of research, development, and initial acquisition procurement of munitions are vested in the Aeronautical Systems Division (ASD) of the Air Force Systems Command. The resultant contracts, once awarded, are passed to the cognizant AMA for administration.² The function of inventory management is performed by WRAMA for air-launched missiles and by OOAMA for all other convention munitions. Hence, the division of responsibility for the management of munitions within the Air Force also complicates the procurement of munitions in that the inventory manager does not control all the resources necessary to munitions management.

3. PROCUREMENT CONTROLS. Control measures within the military departments, as they apply to munitions procurement, are both statutory and administrative in nature. Each of the Services has implemented the ASPRs to the extent necessary to meet its unique needs by publishing applicable procedures, directives, instructions, and regulations at appropriate levels of command. At the secretarial level, procurement management during the Vietnam era has consisted of overall policy guidance, selective decisionmaking, and review of progress in achieving procurement objectives. These controls are generally applicable to all the Services, but there is enough variation to warrant their individual review.

¹Navy Support Plan, 28 December 1966, p. 1-V-3.

²Mr. Aaron J. Racusin, Deputy Assistant Secretary of the Air Force (Procurement), Department of the Air Force, Prepared statement to the Committee on Government Operations, 23, 29, and 30 April 1969.

AMMUNITION

a. Management controls within the Army, as they apply to munitions procurement, are exercised within the framework of the ASPR as implemented by the Army Procurement Procedures (APP), Army Procurement Circulars, AMC, MUCOM, and APSA directives and instructions. Briefly, these controls, as exercised by the ASA(I&L), consist of the following:

(1) Advance Procurement Planning. This process provides for the orderly review of all the interfaces relative to requirements and the consideration of all technical business, policy, operational, and procurement facets for a given item of ammunition.

(2) Determination and Findings. The authority to award contracts through negotiation as opposed to award through formal advertising is provided in 10 U.S. Code 2304 (a), 2306 (c), and 2307 (c). The ASA(I&L), in his capacity as head of an agency, is required to make a finding of fact and determine the authority to be appropriate. The contracting officer must fully document the case and forward it to the ASA(I&L) for his determination when this authority is required.

(3) Pre-Award Review and Notation. Predicated on a list of items of Secretarial interest, which nominally represents 60 percent of the annual Army program value, proposed awards for these items must be submitted to the ASA(I&L) for review and notation prior to award.

(4) Approval for Shift From Competitive to Noncompetitive Award. Approval is required for all contracts awarded in support of SE Asia if the basis of procurement is shifted from competitive to noncompetitive. Service Assistant Secretary (I&L) approval for all awards over \$1 million and Assistant Secretary of Defense (I&L) approval for all awards over \$10 million, if recommended by the Service Assistant Secretary (I&L), is necessary.

(5) Other areas of control retained at the Service Assistant Secretary (I&L) level relate to resolution of protests and extraordinary contractual actions under the authority of PL 85-804.³

b. Control measures within the Navy as they apply to munitions procurement are exercised within the framework of the ASPRs as augmented by Navy Procurement Directives (NPDs), NAVMAT instructions and directives, and SYSCOM directives. Briefly, these controls as exercised at the ASN(I&L) level consist of the following:

(1) Advance Procurement Planning. This planning provides an early guide to potential procurement problems through a review of the interfaces pertinent to requirements, engineering, procurement, and production.

(2) Authority to Negotiate. For most negotiated procurements, authority may be obtained from the ASN(I&L). The Justification for the Authority to Negotiate (JAN) contains facts that explain the necessity for procurement by negotiation rather than by formal advertisement.

(3) Business Clearance. This negotiation plan is prepared by the contracting officer and sets forth technical comments and all significant details of the proposed negotiation, including the procedure to be used. Approval of the business clearance is required prior to negotiation, and after negotiations are completed a post-negotiation submission is tendered for further approval by the Chief of Naval Material prior to award of a contract.

(4) Other Controls

(a) Operations reviews. A periodic review of procurement operations and headquarters organization by the Procurement Management Review Staff.

³Prepared statement of Maj. Gen. Roland B. Anderson, Director of Materiel Acquisition, Office of the Assistant Secretary of the Army (I&L), May 1969.

AMMUNITION

(b) Internal Audits by the Navy Audit Services. The Naval Audit Service, under the Assistant Secretary of the Navy (Financial Management), performs internal audits of procuring activities, concentrating on accounting and pricing aspects.⁴

c. Management controls within the Air Force as they apply to munitions procurement are exercised within the framework of the Armed Service Procurement Regulations as implemented by the Air Force Procurement Instructions (AFPI). It should be noted that the Air Force has recently engaged in a systematic effort to replace the AFPI with supplements to the ASPR. Briefly, the controls as exercised at the Secretarial level consist of the following:

(1) Determination and Findings. Because the authority to negotiate procurements cannot be delegated below the Secretarial level, SAFIL, in his capacity as an HPA, must approve of the use of negotiation for high-dollar R&D contracts, follow-on production contracts, follow-on sole source contracts, and procurements negotiated for the purpose of expanding or retaining the mobilization base.

(2) Sole Source Procurements. This is an administrative procedure to retain Secretarial control over sole procurements in support of SE Asia operations that could have otherwise been procured competitively under other circumstances. Procurements ranging from \$1 million to \$10 million require Secretarial approval; procurements more than \$10 million are subject to Secretary of Defense level approval.

(3) Selection of Contractors for New Weapons Systems. The final decision in the selection of a contractor for a new weapons system is reserved for approval at the Secretarial level after consideration of the findings and recommendations of the Air Force Systems Command.

(4) Procurement Objectives. Progress in achieving procurement objectives is also monitored at the Secretarial level, including extent of competition, small business participation, labor surplus area awards, and types of contracts used.

(5) Other. Reviews by the Inspector General and the Air Force Auditor General. At the Headquarters Air Force level, staff members participate in (a) the work of the Armed Services Procurement Regulation Committee, (b) the development and refinement of procurement policy and procedure guidance, (c) the performance of each of the commands, and (d) visits to each procurement agency. In addition, the Procurement Management Review Group makes on-the-spot reviews of procurement management at each field procurement agency.⁵

4. SUMMARY. Although the Armed Services Procurement Regulations (ASPRs) apply equally to all the military departments, differences exist within the organizations of the respective departments in performing the procurement function. The individual Service Secretaries are, by statute, designated as the head of their respective agencies; in practice, however, the respective Assistant Secretaries for Installations and Logistics are authorized to act for and with the authority of the Secretary in procurement matters. With the exception of the Air Force, the procurement channels flow from the Assistant Secretaries (I&L) to commanders of major material or commodity commands. In the Air Force, the channel flows from the Assistant Secretary (I&L), through the Chief of Staff, Air Force, to the major commands. Within the Army, the functional responsibility for munitions procurement is vested in a single integrated commodity command. On the other hand, within the Navy the munitions procurement responsibility is divided between Naval Air Systems Command, Naval Ordnance Systems Command, and the Naval Supply Systems Command. In the Air Force, the munitions procurement responsibility is divided between the Air Force Systems Command and the Air Force Logistics Command. Insofar as procurement controls are concerned, each of the Services has implemented the ASPRs to the extent necessary to meet the unique needs stemming from organizational and functional characteristics.

⁴Rear Adm. Jamie Adair, Deputy Commander for Ship Acquisition, Naval Ship Systems Command, Prepared statement to the Committee on Government Operations, 23 April 1969.

⁵Mr. Aaron J. Racusin, *op. cit.*

AMMUNITION

Although these controls differ in name and the level at which they may be approved, they are essentially designed to satisfy ASPR or other constraints imposed by the Secretary of Defense.

APPENDIX C
CLASSIFIED TABLES AND FIGURES

(This appendix is classified and is bound separately.)

APPENDIX D
LINE ITEM ASSET ANALYSIS

(This appendix is classified and is bound separately.)

APPENDIX E
DRAWDOWN OF THE ATLANTIC FLEET

(This appendix is classified and is bound separately.)

APPENDIX F
DRAWDOWN OF THE EUROPEAN THEATER

(This appendix is classified and is bound separately.)

APPENDIX G
THE NORTHEAST ASIA CRISIS OF JANUARY 1968

(This appendix is classified and is bound separately.)

APPENDIX H
SUMMARY OF LOGISTICS GUIDANCE
RELATED TO AMMUNITION

(This appendix is classified and is bound separately.)

APPENDIX I
LIST OF ACRONYMS AND ABBREVIATIONS

APPENDIX I

LIST OF ACRONYMS AND ABBREVIATIONS

AAC	Anti-aircraft common; a type of gun projectile (Navy)
AAO	Army Acquisition Objective
AB	Air Base (Air Force)
AD	Air Division (Air Force)
ADC	Aerospace Defense Command (Air Force)
ADP	automatic data processing
AE	Ship-type designation for Ammunition Ship (Navy)
AFB	Air Force Base
AFLC	Air Force Logistics Command
AFPI	Air Force Procurement Instructions
AFSC	Air Force Systems Command
AFSEA	Air Force Southeast Asia Report
AGM	air-launched ground attack missile
AIM	air-launched interceptor missile
AMA	Air Materiel Area (Air Force)
AMC	Army Materiel Command
AMRAD	Air Munitions Requirements and Development Committee
AN-M	Army/Navy Model; a model standardized for use by both Army and Navy; see "M"
AOE	Ship-type designation for Fast Combat Support Ship (Navy)
APOE	Aerial Port of Embarkation
APP	Army Procurement Procedures
APSA	Ammunition Procurement and Supply Agency (Army)
AR	Army Regulation
AS(I&L)	Assistant Secretary for Installations and Logistics
ASA(I&L)	Assistant Secretary of the Army (Installations and Logistics)

AMMUNITION

ASD	Aeronautical Systems Division (Air Force)
ASD	Ammunition Supply Depot (Army)
ASD (I&L)	Assistant Secretary of Defense (Installations and Logistics)
ASN (I&L)	Assistant Secretary of the Navy (Installations and Logistics)
ASOD	Assistant Secretary of Defense designated package of Industrial Plant Equipment
ASP	Ammunition Supply Point
ASPR	Armed Services Procurement Regulations
ASR	Available Supply Rate (Army)
ASW	antisubmarine warfare
AUTODIN	Automatic Digital Networks; a data transmission system
BB	Ship-type designated for Battleship (Navy)
BENZLUX	Belgium, Netherlands, and Luxemburg
BLU	Bomb or mine; unit; see "CBU"
BPU	Base Production Unit
BUAER	Bureau of Aeronautics (Navy)
BUORD	Bureau of Naval Ordnance
BUSANDA	Bureau of Supplies and Accounts (Navy)
BUWEPS	Bureau of Naval Weapons
CA	Ship-type designation for Cruiser (Navy)
CATO	CINCPAC Ammunition Transfer Order
CBU	End item cluster bomb or dispenser; unit; used by the Air Force, in its system of Aeronautical Unit Designations, with an Arabic numeral, to distinguish between different designs of the same type item
CINCEUR	Commander in Chief, Europe
CINCLANTFLT	Commander in Chief, Atlantic Fleet
CINCPAC	Commander in Chief, Pacific
CINCPACFLT	Commander in Chief, Pacific Fleet
CINCUSNAVEUR	Commander in Chief, U.S. Naval Forces, Europe
CMC	Commandant, Marine Corps
CNO	Chief of Naval Operations

AMMUNITION

COMSERVLANT	Commander, Service Forces, Atlantic
COMSERVPAC	Commander, Service Forces, Pacific
COMUSMACTHAI	Commander, U.S. Military Assistance Command, Thailand
COMUSMACV	Commander, U.S. Military Assistance Command, Vietnam
CONARC	Continental Army Command
CONUS	continental United States
COSTAR	Combat Support to the Theater Army
CRAMSHIP	complete round ammunition shipment
CVA	Ship-type designation for Attack Aircraft Carrier (Navy)
CVS	Ship-type designation for Antisubmarine Support Aircraft Carrier (Navy)
DA	Department of Army
DAACA	Department of the Army Allocation Committee, Ammunition
DAFFD	Department of Army Forward Floating Depot
DCAS	Defense Contract Administration Services
DCSLOG	Deputy Chief of Staff, Logistics (Army)
DD	Ship-type designation for Destroyer (Navy)
D-Day	The day hostilities commence
D&F	Determination and Finding
DDG	Ship-type designation for Guided Missile Destroyer (Navy)
DOA	Day of Ammunition (Marine Corps)
DODIC	Department of Defense Identification Code; an alphanumeric code that identifies ammunition items that are interchangeable for issue and use
DNFYF	Department of Navy Five-Year Program
D-to-P	The concept of procuring sufficient stocks of ammunition to support combat operations from D-day to P-day
EARFLAP	Emergency Action Reporting for Logistic Action Programming (Air Force)
EASTPAC	Eastern Pacific
EOD	Explosive Ordnance Disposal
EUCOM	European Command
EUR	Europe

AMMUNITION

EX-AM	Expedited Air Munitions (Navy)
FIC	Fleet Issue Controlled (Navy)
FL	Flashless; a type of gun cartridge (Navy)
FLC	Force Logistics Command (Marine Corps)
FLSG	Force Logistics Support Group (Marine Corps)
FMF	Fleet Marine Force
FMFLANT	Fleet Marine Force, Atlantic
FMFPAC	Fleet Marine Force, Pacific
FSA	Field Storage Area
FSC	Federal Stock Class
FSR	Force Service Regiment (Marine Corps)
FWAF	Free World Assistance Forces
FY	Fiscal Year
FYDP	Five-Year Defense Plan
GAA	General Agency Agreement
GAO	General Accounting Office
GFE	Government-furnished equipment
GOCO	Government-owned contractor-operated
GOGO	Government-owned Government-operated
GP	General Purpose; a category of bomb, as distinguished from Armor Piercing, Demolition, Fragmentation, etc.
HC	high capacity; a type of gun projectile (Navy)
HE	high explosive
HEAT	high explosive antitank
HPA	Head of Procurement Agency
ICP	Inventory Control Point
ICR	Intense Combat Rate (Army)
I&L	Installations and Logistics
ILL	illuminating; a type of projectile
IM	Item Manager

AMMUNITION

IPE	Industrial Plant Equipment
JAN	Justification for the Authority to Negotiate
JLRB	Joint Logistics Review Board
KAMP	Korean Ammunition Procedures; used to provide ammunition to Korean Forces
LAMP	Laotian Ammunition Procedures; used to provide ammunition to Royal Laotian Forces
LANT	Atlantic
LANTFLT	Atlantic Fleet
LASH	Lighter Aboard Ship; a vessel type
LAU	Aircraft installed launcher; unit; see "CBU"
LAW	Light Antitank Weapon; a 66mm rocket
LCU	Landing Craft, Utility
LOC	Line of Communication
LOGSUM	Logistic Summary (CINCPAC)
LSMR	Landing Ship, Medium, Rocket; an inshore fire support ship
LST	Landing Ship, Tank
M	Model; used by the Army, with an Arabic numeral, to distinguish between different designs of the same type item
MACV	Military Assistance Command, Vietnam
MAERU	Mobile Ammunition Evaluation and Renovation Unit (Navy)
MAF	Marine Amphibious Force
MAP	Military Assistance Program
MAW	Marine Air Wing
MCO	Marine Corps Order
M-Day	The day of mobilization
MER	multiple ejector rack; an auxiliary rack capable of holding six bombs
MHE	Materials Handling Equipment
MILCON	Military Construction
MILSTAMP	Military Standard Transportation and Movement Procedures
MILSTRIP	Military Standard Requisitioning and Issue Procedures

AMMUNITION

MIPR	Military Interdepartmental Purchase Request
MK	Mark; used by the Navy, with an Arabic numeral, to distinguish between different designs of the same type item
mm	Millimeter; 25.4 millimeters equals 1 inch
MMS	Munitions Maintenance Squadron (Air Force)
MSAAB	Military Services Ammunition Allocation Board
MSTS	Military Sea Transportation Service
MTMTS	Military Traffic Management and Terminal Service
MTON	measurement ton; a volume measure, used in shipping, equal to 40 cubic feet
MUCOM	Munitions Command (Army)
NAD	Naval Ammunition Depot
NATO	North Atlantic Treaty Organization
NAVEUR	Naval Forces, Europe
NAVAIRSYSCOM	Naval Air Systems Command
NAVMAG	Naval Magazine
NAVMAT	Naval Material Command
NAVORDSYSCOM	Naval Ordnance Systems Command
NAVSUPSYSCOM	Naval Supply Systems Command
NGFS	naval gunfire support
NICP	National Inventory Control Point
NFL	non-flashless; a type of gun cartridge (Navy)
NNOR	Non-Nuclear Ordnance Requirements (Navy)
NNCS	Navy Non-Nuclear Ordnance Study
NOF	Naval Ordnance Facility
NPD	Navy Procurement Directives
NSA	Naval Support Activity
NWS	Naval Weapons Station
O&M	Operations and Maintenance
OOAMA	Ogden Air Materiel Area (Air Force)
OPLAN	Operations Plan

AMMUNITION

OPNAV	Operations Office of the Chief of Naval Operations
OSO	Ordnance Supply Office (Navy)
PACAF	Pacific Air Forces
PACOM	Pacific Command
PAPAPG	PACAF Airmunitions Planning and Programming Guide
PBD	Program Budget Decision
PD	point detonating; a fuze type
P-Day	The day when production of an items equals consumption
PL	Public Law
POL	petroleum, oil, and lubricants
PPWR	pre-positioned war reserve (Army)
PROJ	projectile
PTO	Peacetime Operating Stocks (Air Force)
PWRR	pre-positioned war reserve requirements (Navy)
PWRS	pre-positioned war reserve stocks (Navy)
RCS	Report Control Symbol
RDT&E	Research, Development, Test, and Evaluation
RF	rapid fire; a type of gun cartridge (Navy)
ROK	Republic of Korea
RSR	Required Supply Rate (Army)
RVN	Republic of Vietnam
SAC	Strategic Air Command
SASM	Special Assistant for Strategic Mobility, Joint Chiefs of Staff
SB	Supply Bulletin
SCAMP	Support Command Ammunition Procedures; used for supplying ammunition to free world elements in Vietnam
SEA	Southeast Asia
SEAIR	Southeast Asia Airlift Transportation Pipeline System (Air Force)
SF	slow fire; a type of gun cartridge (Navy)
SISR	Selected Item Status Report

AMMUNITION

SPCC	Ships Parts Control Center
SRO	Standing Route Order
STON	short ton, equal to 2,000 pounds; distinguished from measurement ton (MTON), which is a volume measure, equal to 40 cubic feet
TA	Table of Allowances
TAOR	Tactical Area of Responsibility
T-Day	The day hostilities terminate
TER	triple ejector rack
TIMMS	Totally Integrated Munitions Maintenance System (Air Force)
TIR	Transaction Item Reporting System
TOE	table of organization and equipment
TRSR	Theater Required Supply Rate (Army)
TSR	Theater Supply Rate (Army)
UNIV	universal; a type of gun cartridge (Navy)
UNREP	Underway Replenishment (Navy)
USAAPSA	U.S. Army Ammunition Procurement and Supply Agency
USAF	U.S. Air Force
USAFE	U.S. Air Forces in Europe
USAREight	U.S. Army Eight
USAREUR	U.S. Army, Europe
USARHAW	U.S. Army, Hawaii
USARJ	U.S. Army, Japan
USARPAC	U.S. Army, Pacific
USARV	U.S. Army, Vietnam
USARYIS	U.S. Army, Ryukyu Islands
USC	United States Code
USCINCEUR	U.S. Commander in Chief, Europe
USMC	U.S. Marine Corps
USN	U.S. Navy
USNAVEUR	U.S. Naval Forces, Europe

AMMUNITION

USSTRICOM	U.S. Strike Command
V	Roman numeral five; a supply class which includes all ammunition, but when used with class V(A), is limited to ground ammunition
V(A)	A supply class that includes all aviation ammunition
VAMP	Vietnamese Ammunition Procedures; used to provide ammunition to Vietnamese forces
VNAF	Vietnamese Air Force
VT	variable time; a type of fuze, also called a proximity fuze
V(W)	A supply class that includes all ground ammunition
WAMTMTS	Western Area Military Traffic Management and Terminal Service
WARS	World-wide Ammunition Reporting System (Army)
WCDO	War Consumables Distribution Objective (Air Force)
WESTPAC	Western Pacific
WP	white phosphorous
WRAMA	Warner-Robins Air Materiel Area (Air Force)
WRM	War Readiness Materiel (Air Force)

APPENDIX J
BIBLIOGRAPHY

APPENDIX J BIBLIOGRAPHY

PUBLISHED AND UNPUBLISHED ARTICLES

- Reeder, Maj. Gen. W.O., The Korean Ammunition Shortage, Case Material for Teaching Purposes, Syracuse University. Undated.
 Sharp and Westmoreland, Report on the War in Vietnam, 1968.

U.S. DEPARTMENT OF DEFENSE PUBLICATIONS

- Armed Service Procurement Regulations, Section III, Part 2.
 Department of Defense, Selected Item Status Reports.
 Department of Defense Directive 4005.1, Department of Defense Industrial Mobilization Production Planning Program—Limited War, 23 June 1967.
 Department of Defense Directive 4275.5, Industrial Facility Expansion and Replacement, 14 November 1966.
 Department of Defense Instruction 4005.2, Industrial Mobilization Planning Requirements, 11 September 1967.
 Department of Defense Instruction 4115.1, Department of Defense Coordinated Procurement Program—Purchase Assignments, 14 October 1968.
 Department of Defense Directive 4000.19, Basic Policies and Principles for Interservice and Interdepartmental Logistic Support, 5 August 1967.
 Department of Defense Instruction 4005.3, Industrial Mobilization Production Planning Systems and Procedures, 24 December 1968.
 Secretary of Defense, Logistics Guidance for 1965 (U), (SECRET).
 Secretary of Defense, Logistics Guidance for 1966 (U), (SECRET).
 Secretary of Defense, Logistics Guidance for 1967 (U), (SECRET).
 Secretary of Defense, Logistics Guidance for 1968 (U), (SECRET).
 Secretary of Defense, Logistics Guidance for 1969 (U), (SECRET).
 Secretary of Defense, Logistics Guidance for 1970 (U), (SECRET).
 Secretary of Defense, Logistics Guidance for FY 64-68 Budgets (U), 27 October 1966 (SECRET).
 Secretary of Defense, Non-Nuclear Ordnance Subject Issue #757 for 1967 Budget (U), 13 October 1965 (SECRET).
 Secretary of Defense, Program Budget Decision, Number 230, Air Munitions Controlled (U), 11 December 1967 (CONFIDENTIAL).
 Secretary of Defense, Program Budget Decision, Number 230, Change 1 Revised, Controlled Air Munitions (U), 27 December 1967 (CONFIDENTIAL).
 Secretary of Defense, Program Budget Decision, Number 382, Army Controlled Ground Munitions (U), 16 December 1967 (CONFIDENTIAL).
 Office of the Assistant Secretary of Defense (Air Munitions Directorate), Fact Sheet, Air Munitions (U), 7 January 1969 (SECRET).
 Office of the Assistant Secretary of Defense (Installations and Logistics), Air Munitions Office, Summary Analysis of JCS Recommendations (U), 6 October 1966 (SECRET).
 Office of the Assistant Secretary of Defense (Air Munitions Directorate), Fact Sheet, Air Munitions Production (U), 31 July 1969 (SECRET).
 Office of the Assistant Secretary of Defense (Ground Munitions Directorate), Fact Sheet, Ground Munitions (U), undated (SECRET).
 Office of the Secretary of Defense, Report of the Long Range Logistics Manpower Policy Board (U), February 1969 (CONFIDENTIAL).
 Office of the Assistant Secretary of Defense (Air Munitions Directorate), Air Munitions Production, Consumption and Inventory, Statistical Services, Tables 201-203, undated.

AMMUNITION

Office of the Assistant Secretary of Defense (Installations and Logistics), Summary Analysis of Air Ordnance Assets (U), 31 March 1966 (SECRET).

Office of the Assistant Secretary of Defense (Public Affairs), News Release Number 591-66, Statement by Secretary of Defense, Robert S. McNamara, 11 July 1966.

Office of the Assistant Secretary of Defense (Vietnam Expeditionary Task Force), Flagpole Reports (U), 21 September 1965 through August 1966 (SECRET).

Joint Chiefs of Staff, Publication No. 2.

Commander in Chief, Pacific, Command History, 1966 (U), (SECRET).

Commander in Chief, Pacific, Command History, 1968 (U), (SECRET).

Commander, United States Military Assistance Command, Vietnam, Command History, 1966 (U), (SECRET).

Commander, United States Military Assistance Command, Vietnam, Construction Directive 415-1-10, 24 May 1968.

Commander in Chief, Europe, Command History, 1965 (U), (TOP SECRET).

Commander in Chief, Europe, Command History, 1966 (U), (TOP SECRET).

Commander in Chief, Europe, Command History, 1967 (U), (TOP SECRET).

Commander in Chief, Europe, Command History, 1968 (U), (TOP SECRET).

Pacific Command, PACOM Air Munitions Allocations Documents, Issued Monthly, Report 1965-1969 (SECRET).

Office of the Tri-Service Project Manager for the 2.75" Rocket System, 2.75" Rocket Case Study (U), 17 September 1969 (SECRET).

Project Manager for Bombs and Related Components, Explosive Production Base Case Study, Section IX (U), 26 August 1969 (SECRET).

Department of the Army, Command History of U.S. Army Operation in Southeast Asia, January-December 1965.

Department of the Army Regulation 15-2, Department of the Army Allocations Committee, Ammunition, 12 August 1968.

Department of the Army Regulation 37-40, Army Production Base Support Program Report, 24 January 1967.

Deputy Chief of Staff for Logistics, Cost Comparison Between GOCO and Private Industry, 10 October 1969.

United States Army Materiel Command, Report, Preliminary Review, APSA Class V Ammunition Support to USAF, 9 August 1966.

United States Army Munitions Command, Staff Study on Munitions Readiness, 12 April 1965.

United States Army Munitions Command, The World-wide Ammunition Reporting System, June 1969.

Department of the Navy, Non-Nuclear Ordnance Study, 1965 (U), (SECRET).

Department of the Navy, Non-Nuclear Ordnance Study, 1966 (U), (SECRET).

Department of the Navy, Non-Nuclear Ordnance Report, 1967 (U), (SECRET).

Department of the Navy, Non-Nuclear Ordnance Report, 1968 (U), (SECRET).

Chief of Naval Operations, Point Paper, OP-411D, Air to Ground Munitions in LANTFLT (U), 6 July 1967 (SECRET).

Chief of Naval Operations, Point Paper, OP-411D, Sixth Fleet Ammunition Logistics Posture (U), 8 June 1967 (SECRET).

Commander, Service Forces, Pacific, Operations of the Service Force, United States Pacific Fleet, 1966 (U), (CONFIDENTIAL).

United States Pacific Fleet, 1967 (U), (CONFIDENTIAL).

United States Pacific Fleet, 1968 (U), (CONFIDENTIAL).

Naval Ordnance Systems Command, 5" Ammunition Study, Command Letter 01491, 25 March 1969 (CONFIDENTIAL).

Dixon, Comdr. H., Navy Ammunition Information and Control Systems in the Pacific (U), July 1969 (SECRET).

Department of the Air Force, Air Force Manual 127-100, Explosives Safety Manual, Change 1, 12 June 1968.

United States Air Force, Headquarters (AFSSSGB), Air Force Air Munitions Expenditures/Allocations FY 1966-1969 (U), 25 September 1969 (CONFIDENTIAL).

United States Air Force, Non-Nuclear Consumables Annual Analyses, 1965-1969.

Pacific Air Forces, PACAF Airmunitions Planning and Programming Guide, October 1968.

Pacific Air Forces, PACAF Airmunitions Planning and Programming Guide, 1966-1969.

AMMUNITION

United States Air Force, Headquarters, Air Munitions Daily Log, subject: Flns for 750 lb Bomb Withdrawn from Europe, 20 April 1966.

DOD LETTERS, MEMORANDUMS, AND MESSAGES

Office of the Secretary of Defense, Memorandum, subject: Procurement in Support of SE Asia (U), 20 July 1965 (SECRET).

Secretary of Defense, Memorandum to the Service Secretaries, 5 October 1965 (SECRET).

Secretary of Defense, Memorandum to the Service Secretaries, 11 October 1965 (SECRET).

Secretary of Defense, Memorandum to the Service Secretaries, subject: Procurement of Combat Consumables for SE Asia Operations (U), 15 January 1966 (SECRET).

Secretary of Defense, Memorandum to the Chairman, Joint Chiefs of Staff, subject: Air Munitions Plan for SE Asia (U), 20 June 1966 (SECRET).

Secretary of Defense, Memorandum to the Service Secretaries, 26 August 1966 (SECRET).

Secretary of Defense, Memorandum for the President, subject: General Purpose Forces (U), 12 September 1966 (SECRET).

Secretary of Defense, Memorandum to the Secretary of the Navy, subject: Logistic Guidance for Gun Ammunition and ASW Consumables (U), 16 December 1966 (SECRET).

Office of the Secretary of Defense, Memorandum, subject: Sole Source Procurement Approval, 16 December 1966.

Secretary of Defense, Memorandum for the President, subject: General Purpose Forces (U), 27 December 1966 (SECRET).

Secretary of Defense, Memorandum to Chairman, Joint Chiefs of Staff, subject: Controlled Air Munitions (U), 20 January 1967 (SECRET).

Secretary of Defense, Memorandum to the Assistant Secretaries of Defense (Installations and Logistics and Systems Analysis), 22 September 1967 (SECRET).

Secretary of Defense, Memorandum for the President, subject: General Purpose Forces (U), 9 January 1968 (SECRET).

Office of the Secretary of Defense, Memorandum, subject: Procurement in Support of SE Asia (U), 23 October 1969 (SECRET).

Secretary of Defense, Message 151629 April 1966 (SECRET).

Secretary of Defense, Message 161609 April 1966 (SECRET).

Secretary of Defense, Message 152115 April 1966 (SECRET).

Office of the Assistant Secretary of Defense (Installations and Logistics), Ground Munitions Office, Memorandum Number One, 19 October 1966.

Special Assistant to the Assistant Secretary of Defense (Installations and Logistics) Memorandum to the Service Secretaries, subject: Air Munitions Budgets for FY 1967 and FY 1968 (U), 21 October 1966 (CONFIDENTIAL).

Assistant Secretary of Defense (Installations and Logistics), Memorandum to Director of The Joint Staff, J-4 (Logistics), subject: Allocations of Ground Munitions in Vietnam (U), 24 October 1966 (SECRET).

Office of the Assistant Secretary of Defense (Installations and Logistics), Memorandum, 15 February 1967 (SECRET).

Assistant Secretary of Defense (Comptroller), Memorandum to the Service Secretaries, subject: FY 1969 Budget Estimates (U), 16 June 1967 (CONFIDENTIAL).

Assistant Secretary of Defense (Installations and Logistics), Memorandum, 5 August 1968 (SECRET).

Assistant Secretary of Defense (Installations and Logistics), Letter to General Accounting Office, subject: Review of Status of War Reserve Materiel in the European Theater (OSD Case #2850) (U), 14 January 1969 (SECRET).

Assistant Secretary of Defense (Installations and Logistics), Letter to the Comptroller General of the United States, subject: Status of War Reserve Materiel in Europe (U), 20 December 1969 (SECRET).

Assistant Secretary of Defense (Installations and Logistics), Memorandum for the Secretary of Defense, subject: General Accounting Office Final Report to the Congress on Status of War Reserve Materiel in Europe (OSD Case #2850) (U), 20 December 1969 (SECRET).

Chairman, Joint Chiefs of Staff, Memorandum, JCSM-737-68, to the Secretary of Defense, subject: General Accounting Office Draft Report to the Congress on Status of War Reserve Materiel in the European Theater (U), 12 December 1968 (SECRET).

AMMUNITION

Joint Chiefs of Staff, Message 0837/081946Z April 1966 (SECRET).
 Joint Chiefs of Staff, Message 0837/142345Z April 1966 (SECRET).
 Joint Chiefs of Staff, Message 0837/202107Z September 1966 (SECRET).
 Joint Chiefs of Staff, Message 0837/291917Z November 1966 (SECRET).
 Joint Chiefs of Staff, Message 0837/092311Z November 1966 (SECRET).
 Joint Chiefs of Staff, Message 0837/151422Z November 1966 (SECRET).
 Joint Chiefs of Staff, Message 0837/302040Z November 1966 (SECRET).
 Joint Chiefs of Staff, Message 1625/162332Z December 1966 (SECRET).
 Joint Chiefs of Staff, Message 4412/241745Z January 1967 (SECRET).
 Joint Chiefs of Staff, Message 4412/262247Z January 1967 (SECRET).
 Joint Chiefs of Staff, Message 4412/110013Z March 1967 (SECRET).
 Joint Chiefs of Staff, Message 4412/101944Z May 1967 (SECRET).
 Joint Chiefs of Staff, Message 4412/252346Z January 1968 (SECRET).
 Joint Chiefs of Staff, Message 4412/252347Z January 1968 (SECRET).
 Joint Chiefs of Staff, Message 4412/260102Z January 1968 (SECRET).
 Joint Chiefs of Staff, Message 4412/032012Z June 1968 (SECRET).
 Joint Chiefs of Staff, Message 4412/062247Z December 1968 (SECRET).
 Joint Chiefs of Staff, Message 4412/141948Z March 1969 (SECRET).
 United States European Command, Letter to Gen. Frank S. Besson, Jr., 1 August 1969 (SECRET).
 United States European Command, Letter to Gen. Frank S. Besson, Jr., subject: Chronological List of Drawdowns to SE Asia (U), 20 September 1969 (SECRET).
 Commander in Chief, Europe, Message 041930 May 1968, subject: Logistics Posture Assessment (U), (TOP SECRET).
 Commander in Chief, Europe, Message 101718 December 1968, subject: Logistic Posture Assessment (U), (TOP SECRET).
 Commander in Chief, Pacific, Letter 002367, subject: CINCPAC Munitions Briefing and Related Documents (U), 27 August 1969 (SECRET).
 Commander, Western Area Military Traffic Management and Terminal Service, Letter MTW-AMCO, subject: Control of Rail Cars into Navai Weapons Station Concord, 19 September 1966.
 Commander in Chief, Pacific, Message 132200Z August 1965 (SECRET).
 Commander in Chief, Pacific, Message 122305Z February 1966 (SECRET).
 Commander in Chief, Pacific, Message 090941Z April 1966 (SECRET).
 Commander in Chief, Pacific, Message 270002Z September 1966 (SECRET).
 Commander in Chief, Pacific, Message 160400Z September 1966 (SECRET).
 Commander in Chief, Pacific, Message 262214Z October 1966 (SECRET).
 Commander in Chief, Pacific, Message 220407Z November 1966 (SECRET).
 Commander in Chief, Pacific, Message 260436Z November 1966 (SECRET).
 Commander in Chief, Pacific, Message 120050Z April 1967 (SECRET).
 Commander in Chief, Pacific, Message 260527Z April 1967 (SECRET).
 Commander in Chief, Pacific, Message 290105Z June 1967 (SECRET).
 Commander in Chief, Pacific, Message 161438Z June 1968 (SECRET).
 Commander in Chief, Pacific, Message 160518Z November 1968 (SECRET).
 Commander, United States Military Assistance Command Vietnam,
 Message 12209/080826Z April 1966 (SECRET);
 Message 40477/071225Z September 1966 (SECRET);
 Message 071225Z September 1966 (SECRET).
 Department of the Army, Letter AVCA-CG, Maj. Gen. Heiser to Gen. Besson, 20 March 1969 (SECRET).
 Department of the Army, DCSLOG, Memorandum, subject: Ammunition Logistics in Support of SE Asia Operations 1965-1968 (U), 5 September 1969 (SECRET).
 Assistant Secretary of the Army (Installations and Logistics), Memorandum to Deputy Chief of Staff for Logistics, subject: Transfer of 175mm Projectiles To USARV (U), 3 June 1968 (SECRET).
 Assistant Deputy Chief of Staff for Logistics, Gen. F.T. Chesarak, Memorandum, for the Secretary of The Army, subject: Utilization of Ammunition in Vietnam (U), 22 June 1966 (SECRET).

AMMUNITION

Assistant Deputy Chief of Staff for Logistics, Gen. F.T. Chesarak, Memorandum, For Record, subject: Notes Recorded During Visit to Vietnam 23-30 April 1966, 20 May 1966.

Commander in Chief, United States Army, Pacific, Message 20727/100726Z September 1966 (SECRET);
Message 122310Z September 1966 (SECRET);
Message 230848Z September 1966 (SECRET);
Message 272234Z January 1968 (SECRET).

Secretary of the Navy, Memorandum, Serial 00155, 10 May 1965 (SECRET).

Secretary of the Navy, Memorandum, Serial 00232, 19 July 1965 (SECRET).

Secretary of the Navy, Memorandum to the Secretary of Defense, subject: DPM on General Purpose Force Requirements and Logistics Guidance (U), 13 June 1967 (SECRET).

Assistant Secretary of the Navy (Financial Management), Memorandum, Serial 00229, 9 July 1965 (CONFIDENTIAL).

Commander in Chief, Atlantic, Letter, Adm. E.P. Holmes to Joint Chiefs of Staff, subject: T-Day Planning (U) and enclosure, subject: Statement of LANT COM Deficiencies (U), 6 January 1969 (SECRET).

Commander in Chief, Atlantic, Letter, Adm. E.P. Holmes to Gen. Frank S. Besson, Jr., subject: Assessment of Major Impacts Which U.S. Support of Vietnam War Had on Capability of The Atlantic Command (U), 28 July 1969 (TOP SECRET).

Chief of Naval Operations, Memorandum, Serial 0057P03W, 6 June 1966.

Chief of Naval Operations, Memorandum, Serial 005P03W, subject: Discussion with OASD (I&L) Concerning LANT FLT Air Munitions Reserve (U), 25 February 1967 (SECRET).

Chief of Naval Operations, Internal Memorandum, OP-405 to OP-04, subject: Logistics Guidance for Ammunition (U), 28 September 1967 (SECRET).

Chief of Naval Operations, Memorandum, Serial 914P41, subject: Ammunition Logistics During The Vietnamese War 1965-1969 (U), 5 August 1969 (SECRET).

Commander in Chief, Atlantic Fleet, Staff Memorandum, NRS: 42-54-66, subject: Conventional Ammunition Shortage (U), 17 June 1966 (SECRET).

Commander in Chief, Atlantic Fleet, Staff Memorandum, subject: Effects of Ammunition Diversions (U), 21 November 1966 (SECRET).

Commander in Chief, Pacific Fleet, Letter Serial 00988, 18 September 1969 (SECRET).

Commander, Service Forces, Atlantic, Memorandum, Serial 0068, subject: Gun Ammunition (U), (SECRET).

Commander, Naval Air Systems Command, Letter Air-41245H: SL, 17 February 1969 (SECRET).

Commander, Naval Ordnance Systems Command, Letter, subject: Ammunition Logistics During The Vietnamese War (U), 22 July 1969 (CONFIDENTIAL).

Commander, Naval Weapons Station, Concord, Speedletter Serial #11240, 10 September 1965.

Chief of Naval Operations, Message 271950Z May 1966 (SECRET).

Chief of Naval Operations, Message 312345Z March 1967 (SECRET).

Chief of Naval Operations, Message 031650Z April 1967 (SECRET).

Chief of Naval Operations, Message 121300Z May 1967 (SECRET).

Chief of Naval Operations, Message 251820Z May 1967 (SECRET).

Chief of Naval Operations, Message 261519Z June 1967 (SECRET).

Chief of Naval Operations, Message 132155Z October 1967 (SECRET).

Chief of Naval Operations, Message 302140Z April 1968 (SECRET).

Chief of Naval Operations, Message 151325Z May 1968 (SECRET).

Chief of Naval Operations, Message 081414Z June 1968 (SECRET).

Chief of Naval Operations, Message 271346Z January 1969 (SECRET).

Commander in Chief, Atlantic, Message 200006Z April 1966 (SECRET).

Commander in Chief, Atlantic, Message 062112Z July 1966 (SECRET).

Commander in Chief, United States Naval Forces, Europe, Message 251308Z June 1969, subject: Assessment of Vietnam Impact on USEUCOM (U), (SECRET).

Commander in Chief, Pacific Fleet, Message, 300247Z August 1967 (SECRET).

Commander in Chief, Pacific Fleet, Message, 200334Z April 1968 (SECRET).

Commander in Chief, Pacific Fleet, Message, 150334Z May 1968 (SECRET).

Commander, Service Forces, Atlantic, Message 021737Z February 1967 (SECRET).

Commander, Seventh Fleet, Message 251630Z January 1968 (SECRET).

Commander, Service Forces, Pacific, Message 270157Z January 1968 (SECRET).

Commander, Service Forces, Pacific, Message 300242Z January 1968 (SECRET).

AMMUNITION

Commander, Service Forces, Pacific, Message 070118Z April 1968 (SECRET).
Commander, Service Forces, Pacific, Message 080233Z March 1968 (SECRET).
Naval Ordnance Systems Command, Message 301425Z June 1969 (CONFIDENTIAL).
Commandant, Marine Corps, Memorandum C911543, subject: Ammunition Logistics in Support of SE Asia Operations 1965-1968 (U), 1 August 1969 (CONFIDENTIAL).
Fleet Marine Force, Pacific, Letter Serial 8011, subject: Fleet Marine Force, Pacific Class V Briefing (U), 5 September 1969 (SECRET).
Headquarters, United States Air Force (AFSDC), Letter, subject: Logistic Posture at Start of the Vietnam Build-up (U), 13 May 1969 (CONFIDENTIAL).
Headquarters, United States Air Force (AFSSS), Letter, subject: Munition Logistics During the Vietnam Conflict (U), 16 September 1969 (CONFIDENTIAL).
Pacific Air Forces, Message 240219Z September 1965, subject: Munitions Support and Complete Round Control (U), (SECRET).
United States Air Forces in Europe, Letter to European Command, subject: Assessment of Impact on USAFE Resulting From Support of Vietnam Conflict (U), 1 August 1969 (SECRET).

CONGRESSIONAL DOCUMENTS

U.S. Congress, Senate, Committee on Armed Forces, Ammunition Shortages in the Armed Services (U), Hearings before the Preparedness Subcommittee No. 2, April 1953 (SECRET).
U.S. Congress, Senate, Preparedness Investigating Subcommittee; Departments of the Army and Air Force Responses to Questions Concerning, Ground Munitions and Non-Nuclear Air Munitions Status (U), 1965 (SECRET).
U.S. Congress, Senate, Shortages of Army Ammunition (U), Testimony by General Johnson, Army Chief of Staff, before the Preparedness Investigating Subcommittee, 26 January 1966 (SECRET).
U.S. Congress, Senate Preparedness Investigating Subcommittee, Report on the Status of Munitions in Southeast Asia (U), 8 February 1967 (SECRET).
U.S. Congress, Senate, World Wide Military Commitments (U), Hearings, before the Preparedness Investigating Subcommittee, 21 February 1967 (SECRET).
U.S. Congress, Comptroller General of the United States, General Accounting Office, Draft Report to the Congress, Status of War Reserve Materiel in Europe B-146858 (U), 31 October 1968 (SECRET).
U.S. Congress, Comptroller General of the United States, General Accounting Office, Final Report to the Congress, Status of War Reserve Materiel in Europe B-146858 (U), 6 October 1969 (SECRET).

BRIEFINGS, INTERVIEWS, AND CONFERENCE MINUTES

Ignatius, Paul R., Assistant Secretary of Defense (Installations and Logistics), Address Before the American Forging Association, Chicago, Illinois, 16 December 1966.
Stanwix - Hay, Maj. Gen., U.S. Army, A Concept of Intensive Management, Presentation before the Defense I&L Conference, Ramey Air Force Base, Puerto Rico, 31 October 1968.
Hooper, Rear Adm. Edwin B., Briefing for the Deputy Secretary of Defense, 10 February 1969 (CONFIDENTIAL).
Charles, Robert H., Assistant Secretary of the Air Force (Installations and Logistics), Address at Annual Meeting of the Forging Industry Association, White Sulphur Spring, West Virginia, 26 May 1967.
Commander, United States Military Assistance Command, Vietnam, J-4 Briefing for General Besson, 9 January 1966.
United States Army Ammunition Procurement and Supply Agency, Briefing for Joint Logistics Review Board Ammunition Team, subject: Army Ammunition Production Base (U), 9 July 1969 (SECRET).
Department of Army, 1st Logistical Command, Briefing for Joint Logistic Review Board Ammunition Team, 13 August 1969 (SECRET).
Military Sea Transportation Service, Presentation before the Joint Logistics Review Board, 19 June 1969 (SECRET).

AMMUNITION

United States Army, Pacific, Briefing to the Joint Logistics Review Board Ammunition Team, 6 August 1969 (CONFIDENTIAL).
Commander in Chief, U.S. Naval Forces, Europe, Briefing to the Joint Logistics Review Board, subject: Impact that the Vietnam War had on NAVEUR's Ammunition Stocks and Current Assessment (U), 10 October 1969 (SECRET).
Commander in Chief, Pacific Fleet, Briefing for the Joint Logistics Review Board, 9 September 1969 (SECRET).
Commander, Service Forces, Pacific, Briefing for the Joint Logistics Review Board Ammunition Team, 30 July 1969 (SECRET).
Ships Parts Control Center, Mechanicsburg, Pennsylvania, Briefing for the Joint Logistics Review Board Ammunition Team, 25 September 1969 (CONFIDENTIAL).
Naval Weapon Station, Concord, Briefing for the Joint Logistics Review Board Ammunition Team, 29 July 1969 (CONFIDENTIAL).
Pacific Air Forces, Briefing for the Joint Logistics Review Board Ammunition Team, 6 August 1969 (SECRET).
United States Air Force, Ogden Air Materiel Area, Briefing for the Joint Logistics Review Board Ammunition Team, 28 July 1969 (SECRET).